UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2003/01457 (FS)
2003/01458 (BLM)

March 19, 2004

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Re: Endangered Species Act Formal Section 7 Consultation on Resource Management Plans for Nine Bureau of Land Management Districts and Land and Resource Management Plans for Seventeen National Forests Within the Northwest Forest Plan Area, as Amended by the October 2003, FSEIS Clarifying Provisions Relating to the Aquatic Conservation Strategy

Enclosed is a biological and conference opinion (Opinion) prepared by the National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of implementing the programmatic management direction in nine Bureau of Land Management (BLM) Resource Management Plans (RMPs) and sixteen National Forest Land and Resource Management Plans (LRMPs) within the Northwest Forest Plan (NWFP) Area. The tribal lands of the Coquille Forest in Oregon are also included in this Opinion. In addition to the continued implementation of the RMPs/LRMPs, this Opinion also considers the effects of implementing the clarifying provisions relating to the NWFP Aquatic Conservation Strategy, as described in the final supplemental environmental impact statement issued jointly by the USFS and BLM on October 31, 2003. These clarifying provisions apply to all 25 RMPs within the NWFP area.

NOAA Fisheries concludes in this Opinion that the proposed action is not likely to jeopardize the continued existence of 22 Pacific salmon Evolutionarily Significant Units (ESU) (4 endangered and 18 threatened) within NOAA Fisheries' jurisdiction, nor will it destroy or adversely modify critical habitat designated for 6 Pacific salmon ESUs (Table 1).

Table 1. The ESUs' Designated or Proposed Critical Habitat and Candidate ESUs Considered in this Biological Opinion.

Species	ESU or Critical Habitat	Species Acronym	ESA Status	Federal Register Notice and Date
Chinook Salmon	California Coastal	CCC	Threatened	64 FR 50394 9/16/99
	Central Valley spring-run	CVSC	Threatened	64 FR 50394 9/16/99
	Sacramento River winter-run	SRWC	Endangered	59 FR 440 1-4-94
	Snake River Spring/Summer-run	SRSSC	Threatened	57 FR 14653 4/22/92
	Snake River Fall-run	SRFC	Threatened	57 FR 14653 4/22/92
	Upper Columbia River spring-run	UCRSC	Endangered	64 FR 14308 3/24/99
	Upper Willamette River	UWRC	Threatened	64 FR 14308 3/24/99
	Lower Columbia River	LCRC	Threatened	64 FR 14308 3/24/99
	Puget Sound	PSC	Threatened	64 FR 14308 3/24/99
	Central Valley fall and late fall-run	CVFC	Candidate	64 FR 50394 9-16-99
	Critical habitat for Sacramento River winter-run chinook salmon ESU	SRWC	Designated	58 FR 46944 9/3/93
	Critical habitat for Snake River Spring/Summer chinook salmon ESU	SRSSC	Designated	58 FR 68543 12/28/93
	Critical habitat for Snake River Fall chinook salmon ESU	SRFC	Designated	58 FR 68543 12/28/93
Coho Salmon	Puget Sound/Strait of Georgia	PSSGC	Candidate	60 FR 38011 7/25/95
	Lower Columbia River/Southwest Washington	LCRSWC	Candidate	60 FR 38011 7/25/95
	Central California Coast	CCCC	Threatened	61 FR 56138 10/31/96
	Oregon Coast	OCC	~~Threatened~~ (listing invalidated)	63 FR 42587 8/10/98
	Southern Oregon/ Northern California Coast	SONCCC	Threatened	62 FR 24588 5/6/97
	Critical habitat for Central California Coast coho salmon ESU	CCCC	Designated	64 FR 24049 5/5/99
	Critical habitat for Southern Oregon/	SONCCC	Designated	64 FR 24049

Species	ESU or Critical Habitat	Species Acronym	ESA Status	Federal Register Notice and Date
	Northern California Coast Coho ESU			5/5/99
Chum Salmon	Hood Canal summer-run	HCSC	Threatened	64 FR 14508 3/25/99
	Columbia River	CRC	Threatened	64 FR 14508 3/25/99
Sockeye Salmon	Snake River sockeye	SRS	Endangered	56 FR 58619 11/20/91
	Critical habitat for Snake River sockeye salmon ESU	SRS	Designated	58 FR 68543 12/28/93
Steelhead	Upper Columbia River	UCRS	Endangered	62 FR 43937 8/18/97
	Lower Columbia River	LCRS	Threatened	63 FR 13347 3/19/98
	Snake River Basin	SRBS	Threatened	62 FR 43937 8/18/97
	Oregon Coast	OCS	Candidate	63 FR 13347 3/19/98
	Middle Columbia River	MCRS	Threatened	64 FR 14517 3/25/99
	Upper Willamette River	UWRS	Threatened	64 FR 14517 3/25/99
	Northern California	NCS	Threatened	65 FR 36074 6/7/2000
	Central California Coast	CCCS	Threatened	62 FR 43937 9/18/97
	Central Valley	CVS	Threatened	63 FR 13347 3/19/98

This Opinion also addresses 4 ESU candidates for ESA listing (note that candidates for listing receive no protection under the ESA and the action agencies are under no legal obligation to pursuant to the ESA to protect them).

This Opinion does not in authorize any incidental take of listed species, and an incidental take statement is not included. Individual land management actions, groups of actions, and programmatic actions will be consulted upon subsequently using appropriate analytical methods, in accordance with the procedures established in the Interagency Cooperation regulations for implementing section 7 of the ESA (50 CFR 402), as well as interagency agreements and guidance on streamlining consultation with the action agencies. This Opinion supercedes a number of previous plan-level biological opinions, as described in Table 2

Table 2. Previous Plan-Level Biological Opinions issued by NOAA Fisheries Addressing Listed Fish ESUs, and/or Critical Habitat (proposed or designated) for Administrative Units within the NWFP Area that are superceded by this Opinion.

Biological Opinion Date/ Consulting Agency	ESU	Aquatic Conservation Strategy	National Forests/ National Scenic Area (NSA)	BLM District, Resource Area or National Conservation Area (NCA)
March 18, 1997 NOAA Fisheries	URCT (Jurisdiction transferred to USFWS)	Northwest Forest Plan	Siskiyou, Umpqua and Siuslaw	Coos Bay, Roseburg, and Eugene
June 20, 1997 NOAA Fisheries	CCCC; SONCCC	Northwest Forest Plan	Klamath, Shasta-Trinity, Mendocino, Six Rivers	Arcata, Redding, Ukiah, King Range NCA
July 9, 1997 NOAA Fisheries	SONCCC	Northwest Forest Plan	Rogue River, Siskiyou, Umpqua and Winema	Coos Bay and Medford
March 19, 1998 NOAA Fisheries	LCRS	Northwest Forest Plan	Gifford Pinchot Mt. Hood Columbia River Gorge NSA	Salem
June 4, 1998 NOAA Fisheries	CVS	PACFISH	Lassen	None
June 22, 1998 NOAA Fisheries (incorporates by reference the March 1, 1995 biological opinion)	UCRS	Northwest Forest Plan and PACFISH	Okanogan Wenatchee	None
September 29, 1998 NOAA Fisheries	OCC	Northwest Forest Plan	Siskiyou Umpqua Siuslaw	Medford, Coos Bay, Eugene, Salem and Roseburg
August 6, 1999 NOAA Fisheries	Critical Habitat for SONCCC	Northwest Forest Plan	Rogue River Siskiyou Umpqua Winema	Coos Bay Medford
October 29, 1999 NOAA Fisheries	CVSC	PACFISH	Lassen	None
December 22, 2000 NOAA Fisheries	CVS; CVSC	Sierra Nevada Forest Plan Amendment	Lassen	None
April 16, 2001 NOAA Fisheries	NCS; CCCS; CVS; CCC; CVSC; Critical Habitat for SONCCC; Critical Habitat for CCCC	Northwest Forest Plan	Klamath, Shasta-Trinity, Mendocino, Six Rivers	Arcata, Redding, Ukiah, King Range NCA

Please direct any questions regarding this consultation to Steve Morris of my staff in the Oregon State Habitat Office at 503.808.2176.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation
Biological and Conference Opinion

U.S.D.A Forest Service and U.S.D.I Bureau of Land Management
Land and/or Resource Management Plans in the Northwest Forest Plan Area

Agency:	U.S.D.A. Forest Service and U.S.D.I Bureau of Land Management
Consultation Conducted By:	National Marine Fisheries Service, Northwest Region
Date Issued:	March 19, 2004
Issued by:	For Michael R Crouse _________________ D. Robert Lohn Regional Administrator
Refer to:	**2003/01457 (FS)** **2003/01458 (BLM)**

Executive Summary

This biological opinion (Opinion) was prepared by the National Marine Fisheries Service (NOAA Fisheries) in response to the October 17, 2003, request from the Forest Service (USFS) and Bureau of Land Management (BLM) for consultation under section 7 of the Endangered Species Act (ESA) (16 USC 1531 *et seq.*) regarding the potential effects of 26 Resource Management Plans (RMP) within the Northwest Forest Plan (NWFP) area, on listed, proposed, and candidate Pacific salmonids. Included in that request are 15 USFS National Forest Land and Resource Management Plans, 8 BLM District Resource Management Plans, the Columbia River Gorge National Scenic Area (CRGNSA) and the King Range National Conservation Area (KRNCA) management plans. Additionally, the tribal lands of the Coquille Forest in Oregon are included in this Opinion.

Accompanying the October 17, 2003, request for consultation was an October 2, 2003, Biological Assessment (BA) (USDA and USDI 2003b) that addressed the effects of the comprehensive, regional NWFP Aquatic Conservation Strategy (ACS) as it amended or was incorporated into all relevant USFS and BLM RMPs, including a proposed amendment clarifying the ACS titled: "Draft Supplemental Environmental Impact Statement for Clarification of Language in the 1994 Record of Decision for the Northwest Forest Plan; National Forests and Bureau of Land Management Districts Within the Range of the Northern Spotted Owl, April 13, 1994" (ACS EIS) (USDA and USDI 2003a). Additionally, on March 17, 2004, NOAA Fisheries received a letter from the USFS and BLM (USDA and USDI 2004) explaining that the Record Of Decision (2004 ROD) subsequent to the EIS contains language that further clarifies ACS implementation issues addressed in the above amendment. The ROD language discussed in the March 17, 2004, letter does not affect or otherwise invalidate the analysis in the October 2, 2003, BA. This amendment makes limited changes to clarify how the USFS and BLM are to design projects to comply with the ACS. Under this amendment, land managers are required to design projects to comply with applicable standards and guidelines in sections C and D of Attachment A in the NWFP Record of Decision (1994 ROD) (USDA and USDI 1994b). Also, each project record will demonstrate how the agency used relevant information from applicable Watershed Analysis (WA) to provide context for project planning, recognizing that Watershed Analysis is not a decision-making process in and of itself, nor is Watershed Analysis a decision document.

The RMPs establish broad management direction through goals, objectives, desired future conditions, and/or standards and guidelines. The plans also establish goals and objectives regarding where, when, and how goods and services will be produced. Each plan has either been amended by or fully incorporates the management goals and objectives, land allocations, and standards and guidelines of the 1994 ROD, including the ACS, which was designed to protect salmon and steelhead habitat on Federal lands managed by the USFS and BLM by maintaining and restoring ecosystem health at watershed and landscape scales.

In addition to the 22 anadromous fish Evolutionarily Significant Units (ESU) (4 endangered and 18 threatened) within NOAA Fisheries' jurisdiction, this Opinion also addresses 4 ESU candidates for ESA listing, and 6 designated anadromous fish ESU critical habitats (note that candidates for listing receive no protection under the ESA and the action agencies are under no legal obligation to pursuant to the ESA to protect them).

In previous consultations (dated March 18, 1997; June 20, 1997; July 9, 1997; March 19, 1998; June 22, 1998; September 28, 1998; May 25, 2000; April 16, 2001), NOAA Fisheries determined that implementation of the RMPs is not likely to jeopardize the continued existence of the subject listed salmonid species, or adversely modify designated critical habitat.

This Opinion addresses the effects of the implementation of the subject RMPs on anadromous fish ESUs under NOAA Fisheries jurisdiction within the NWFP area. This includes implementation of the RMPs as amended by the NWFP ROD subsequent to earlier ESA consultations (Table 1), and as amended by the ACS EIS (USDA and USDI 2003a).

The RMPs as amended by the NWFP and the ACS EIS do not provide the final authorization for project implementation. Final authorization of projects hinges on the analysis of site-specific effects, which includes site-specific ESA consultations, NEPA analysis, and consistency with appropriate management direction (RMPs, ROD, and other laws). Effects of individual projects to ESA-listed species and designated critical habitat will be evaluated in future project-specific ESA section 7 consultations.

This Opinion, based upon the best scientific and commercial information available and the analysis of information presented in the BA , as well as on analyses included in previous consultation documents (included by reference), determines that implementation of the referenced RMPs is not likely to jeopardize the continued existence of the subject listed salmonid ESUs, nor will it result in the destruction or adverse modification of designated critical habitat. The Opinion further concludes that the original assumptions regarding NWFP outcomes (USDA and USDI 1994a, 1994b) are still valid relative to protection and restoration of anadromous fish and riparian habitat and the survivability of listed fish populations under this management strategy.

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1. INTRODUCTION

1.1 Background and Consultation History

On October 17, 2003, the National Marine Fisheries Service (NOAA Fisheries) received from the Regional Foresters, Regions 5 and 6, of the USDA Forest Service (USFS) and the State Directors, Oregon and Washington, and California of the Bureau of Land Management (BLM), a letter requesting conference and consultation under section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq*.) regarding the potential effects of USFS and BLM land and resource management plans (RMPs) on listed and candidate Pacific salmonid species. A corresponding October 2, 2003, biological assessment (BA) titled "Biological Assessment of the USDA Forest Service (USFS) and USDI Bureau of Land Management (BLM) Land and/or Resource Management Plans (RMPs) in the Northwest Forest Plan (NWFP) Area" was enclosed (USDA and USDI 2003b). This request for consultation was subsequent to the release of the October 2003, Supplemental Environmental Impact Statement for Clarification of Language in the 1994 Record of Decision (USDA and USDI 2003a). Additionally, on March 17, 2004, NOAA Fisheries received a letter from the USFS and BLM (USDA and USDI 2004) explaining that the Record Of Decision (2004 ROD) subsequent to the EIS contains language that further clarifies ACS implementation issues addressed in the above amendment. The ROD language discussed in the March 17, 2004, letter does not affect or otherwise invalidate the analysis in the October 2, 2003, BA.

1.1.1 1994 ROD Consultations

With the exception of the Modoc and Lassen National Forests (NF) the potential effects of the continued implementation of individual USFS and BLM RMPs have been assessed and analyzed for one or more of the ESA-listed fish species, proposed fish species, candidate fish species or critical habitat considered in this Opinion since the signing of the 1994 ROD (USDA and USDI 1994b). The NWFP portions of the Lassen and Modoc NFs do not contain habitat for anadromous fish species because passage into the upper Sacramento River basin is blocked by Shasta and Keswick dams and passage into the Klamath River basin is blocked by Iron Gate Dam. Based on these individual or batched assessments of the USFS and BLM RMPs in the NWFP area, 10 consultations and/or conferences with NOAA Fisheries were concluded between 1997 and 2001 (Tables 1 and 2). Many of the NOAA Fisheries biological opinions listed in Table 1 were initially conference opinions that were eventually adopted as biological opinions upon the listing of the subject ESUs. One conference opinion remains in effect for the RMP affecting the Oregon Coast steelhead salmon ESU (Table 2).

Table 1. Previous Plan-Level Biological Opinions issued by NOAA Fisheries Addressing Listed Fish ESUs, and/or Critical Habitat (proposed or designated) for Administrative Units within the NWFP Area that are superceded by this Opinion.

Biological Opinion Date	**ESU**	**Aquatic Conservation Strategy**	**National Forests/ National Scenic Area (NSA)**	**BLM District, Resource Area or National Conservation Area (NCA)**
March 18, 1997	URCT (Jurisdiction transferred to USFWS)	Northwest Forest Plan	Siskiyou, Umpqua, Siuslaw	Coos Bay, Roseburg, and Eugene
June 20, 1997	CCCC; SONCCC	Northwest Forest Plan	Klamath, Shasta-Trinity, Mendocino, Six Rivers	Arcata, Redding, Ukiah, King Range NCA
July 9, 1997	SONCCC	Northwest Forest Plan	Rogue River, Siskiyou, Umpqua and Winema	Coos Bay and Medford
March 19, 1998	LCRS	Northwest Forest Plan	Gifford Pinchot, Mt. Hood, Columbia River Gorge NSA	Salem
June 4, 1998	CVS	PACFISH	Lassen	None
June 22, 1998 (incorporates by reference the March 1, 1995 biological opinion)	UCRS	Northwest Forest Plan and PACFISH	Okanogan, Wenatchee	None
September 29, 1998	OCC	Northwest Forest Plan	Siskiyou, Umpqua, Siuslaw	Medford, Coos Bay, Eugene, Salem and Roseburg
August 6, 1999	Critical Habitat for SONCCC	Northwest Forest Plan	Rogue River, Siskiyou, Umpqua, Winema	Coos Bay Medford
October 29, 1999	CVSC	PACFISH	Lassen	None
December 22, 2000	CVS; CVSC	Sierra Nevada Forest Plan Amendment	Lassen	None
April 16, 2001	NCS; CCCS; CVS; CCC; CVSC; Critical Habitat for SONCCC; Critical Habitat for CCCC	Northwest Forest Plan	Klamath, Shasta-Trinity, Mendocino, Six Rivers	Arcata, Redding, Ukiah, King Range NCA

Table 2. Previous Plan-Level Conference Opinions (CO) Issued by NOAA Fisheries Addressing Candidate Anadromous Fish ESUs Administrative Units Within the NWFP Area.
Note: Candidates for listing receive no protection under the ESA, and the action agencies are under no legal obligation pursuant to the ESA to protect them.

Conference Opinion Date	ESU/DPS	Aquatic Conservation Strategy	National Forests	BLM District or Resource Area
March 18, 1997	Oregon Coast steelhead ESU	Northwest Forest Plan	Siskiyou, Umpqua, Siuslaw	Medford, Coos Bay, Eugene, Salem, Roseburg

In 1993, the biological assessment for alternative 9 (the selected alternative) of the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old Growth Forest related Species within the Range of the Northern Spotted Owl (USDA and USDI 1994a) included the action agencies' determination that four anadromous fish then listed would not be affected by the NWFP ACS. These ESUs are: (1) Sacramento River winter chinook salmon; (2) Snake River fall chinook salmon; (3) Snake River spring/summer chinook salmon; and (4) Snake River sockeye salmon. However, due to the potential to affect designated critical habitat, the impacts of the ACS amendment on the critical habitat of these ESUs are considered in this Opinion.

1.1.2 Additional RMP Amendments

In addition to the ACS amendment, the BA considered any amendments to the RMPs that have occurred since the last consultation on the RMPs. Of the 30 (25 of which are included in this consultation) administrative units in the NWFP area, 3 administrative units identified amendments to their RMPs that may affect the listed fish or critical habitat identified in this Opinion. The Deschutes, Mt. Baker Snoqualmie and Wenatchee National Forests each reported one amendment affecting listed fish species. Formal or informal consultation has been concluded with the appropriate consulting agency on all three of those amendments.

1.1.3 PACFISH and INFISH

The 1994 ROD provides an ACS for only a portion of the range of several of the anadromous fish ESUs. PACFISH and INFISH are also aquatic conservation strategies designed to minimize adverse effects to anadromous or inland native fish habitat, respectively. In 1995, the Deschutes, Okanogan and Winema NFs were amended by the INFISH ACS, and the CRGNSA, Lassen and Okanogan NFs were amended by the PACFISH ACS. Consultations with NOAA Fisheries regarding these RMPs as amended by INFISH or/and PACFISH are identified in Table 1. Additionally, the interim PACFISH ACS for the Lassen NF was replaced with a long-term conservation strategy for which consultation with NOAA Fisheries was completed in December, 2000 (Table 1).

1.2 Description of the Proposed Action

The USFS and BLM have requested ESA consultation with NOAA Fisheries on 26 RMPs governing 15 NFs, 8 BLM Districts or Resource Areas, the CRGNSA, and the King Range National Conservation Area (KRNCA). The corresponding RMPs cover ongoing and programmatic activities on Federal land within the range of the northern spotted owl, as amended by the 1994 ROD and further amended by the Supplemental Environmental Impact Statement for Clarification of Language in the 1994 Record of Decision (USDA and USDI 2003a).

1.2.1 Administrative Units

The 25 Administrative Units/Management Plans are as follows:

US Forest Service:		
National Forests	**National Forests**	**National Scenic Area**
Gifford Pinchot	Rogue River	Columbia River Gorge
Klamath	Six Rivers	
Mendocino	Siskiyou	
Mt. Baker-Snoqualmie	Shasta Trinity	
Wenatchee	Siuslaw	
Mt. Hood	Umpqua	
Okanogan	Willamette	
Olympic		

Bureau of Land Management:		
District	**Resource Area**	**National Conservation Area**
Coos Bay	Arcata	King Range
Eugene	Redding	
Medford	Ukiah	
Roseburg		
Salem		

Additionally, the tribal lands of the Coquille Forest in Oregon are included in this Opinion, as well as non-NWFP areas of the Mendocino and Wenatchee National Forests.

1.2.2 Species Addressed

This Opinion analyzes the effects of the implementation of the 25 RMPs on 22 ESA-listed ESUs under NOAA Fisheries jurisdiction (4 endangered and 18 threatened), 4 anadromous fish ESU candidates for ESA listing, and 6 designated critical habitats for anadromous fish ESUs. These listed species, candidates, and critical habitat designations are listed below in Table 3. This Opinion does not evaluate the effects of the subject RMPs on Umpqua River cutthroat trout which was incorporated into a larger coastal cutthroat trout ESU. Jurisdiction for the coastal cutthroat trout ESU was transferred to the U.S. Fish and Wildlife Service (USFWS) (65 FR 21376 April 21, 2000), and it was subsequently removed from the Endangered Species List (65 FR 24420 April 26, 2000).

On September 12, 2001, in the case *Alsea Valley Alliance v. Evans*, U.S. District Court Judge Michael Hogan issued an order that had the effect of lifting the protections afforded Oregon Coast (OC) coho salmon under the Endangered Species Act (ESA), while remanding the listing decision to NOAA Fisheries for further consideration. In November 2001, the District Court's ruling was appealed. Pending resolution of the appeal, the Ninth Circuit Court of Appeals stayed the District Court's remand order and invalidation of the 1998 listing decision. While the stay was in place, the OC coho ESU was again afforded the protections of the ESA. On February 24, 2004, the Ninth Circuit dismissed the appeal in Alsea. Consistent with Judge Hogan's order and the opinion of the Ninth Circuit, NOAA Fisheries will not consider the OC coho listing to have any enforceable effect for the purposes of either the section 7 consultation process or the prohibitions against taking associated with sections 4(d) and 9 of the ESA.

NOAA Fisheries is reviewing the biological status of OC coho, and expects to complete this review later this year. In the event that NOAA Fisheries finds that a new listing is warranted, OC coho would be proposed for listing. For the purposes of this consultation, NOAA Fisheries considers this a conference opinion for OC coho salmon, which may be adopted as a biological opinion should the species again be afforded protection under the ESA.

Table 3. The ESUs' Designated or Proposed Critical Habitat and Candidate ESUs Considered in this Biological Opinion.

Species	ESU or Critical Habitat	Species Acronym	ESA Status	Federal Register Notice and Date
Chinook Salmon	California Coastal	CCC	Threatened	64 FR 50394 9/16/99
	Central Valley spring-run	CVSC	Threatened	64 FR 50394 9/16/99

Species	ESU or Critical Habitat	Species Acronym	ESA Status	Federal Register Notice and Date
	Sacramento River winter-run	SRWC	Endangered	59 FR 440 1-4-94
	Snake River Spring/Summer-run	SRSSC	Threatened	57 FR 14653 4/22/92
	Snake River Fall-run	SRFC	Threatened	57 FR 14653 4/22/92
	Upper Columbia River spring-run	UCRSC	Endangered	64 FR 14308 3/24/99
	Upper Willamette River	UWRC	Threatened	64 FR 14308 3/24/99
	Lower Columbia River	LCRC	Threatened	64 FR 14308 3/24/99
	Puget Sound	PSC	Threatened	64 FR 14308 3/24/99
	Central Valley fall and late fall-run	CVFC	Candidate	64 FR 50394 9-16-99
	Critical habitat for Sacramento River winter-run chinook salmon ESU	SRWC	Designated	58 FR 46944 9/3/93
	Critical habitat for Snake River Spring/Summer chinook salmon ESU	SRSSC	Designated	58 FR 68543 12/28/93
	Critical habitat for Snake River Fall chinook salmon ESU	SRFC	Designated	58 FR 68543 12/28/93
Coho Salmon	Puget Sound/Strait of Georgia	PSSGC	Candidate	60 FR 38011 7/25/95
	Lower Columbia River/Southwest Washington	LCRSWC	Candidate	60 FR 38011 7/25/95
	Central California Coast	CCCC	Threatened	61 FR 56138 10/31/96
	Oregon Coast	OCC	~~Threatened~~ (invalidated)	63 FR 42587 8/10/98
	Southern Oregon/ Northern California Coast	SONCCC	Threatened	62 FR 24588 5/6/97
	Critical habitat for Central California Coast coho salmon ESU	CCCC	Designated	64 FR 24049 5/5/99
	Critical habitat for Southern Oregon/ Northern California Coast Coho ESU	SONCCC	Designated	64 FR 24049 5/5/99
Chum Salmon	Hood Canal summer-run	HCSC	Threatened	64 FR 14508 3/25/99
	Columbia River	CRC	Threatened	64 FR 14508 3/25/99
Sockeye Salmon	Snake River sockeye	SRS	Endangered	56 FR 58619 11/20/91
	Critical habitat for Snake River sockeye salmon ESU	SRS	Designated	58 FR 68543 12/28/93
Steelhead	Upper Columbia River	UCRS	Endangered	62 FR 43937

Species	ESU or Critical Habitat	Species Acronym	ESA Status	Federal Register Notice and Date
				8/18/97
	Lower Columbia River	LCRS	Threatened	63 FR 13347 3/19/98
	Snake River Basin	SRBS	Threatened	62 FR 43937 8/18/97
	Oregon Coast	OCS	Candidate	63 FR 13347 3/19/98
	Middle Columbia River	MCRS	Threatened	64 FR 14517 3/25/99
	Upper Willamette River	UWRS	Threatened	64 FR 14517 3/25/99
	Northern California	NCS	Threatened	65 FR 36074 6/7/2000
	Central California Coast	CCCS	Threatened	62 FR 43937 9/18/97
	Central Valley	CVS	Threatened	63 FR 13347 3/19/98

The number of species affected by individual RMPs differs by administrative unit. The individual plans require consultation for listed fish ESUs and designated critical habitat whereas candidate ESUs require informal conferencing. However, candidates for listing receive no protection under the ESA and the action agencies are under no legal obligation pursuant to the ESA to protect them. Table 4 displays the species and critical habitats affected by each USFS or BLM RMP. The NWFP portions of the Lassen and Modoc NFs do not contain habitat for anadromous fish species because passage into the upper Sacramento River basin is blocked by Shasta and Keswick dams and passage into the Klamath River basin is blocked by Iron Gate Dam.

Table 4. Species and Critical Habitat Affected by USFS and BLM Administrative Units in NWFP. The acronyms for the species are listed in Table 3.

Administrative Unit	Listed Species	Designated Critical Habitat	Proposed Critical Habitat	Candidate Species
Columbia River Gorge NSA	LCRC, LCRS, CRC, SRBS, SRS, SRSSC, SRFC	SRSSC, SRFC, SRS		LCRSWC
Gifford Pinchot	LCRC, LCRS, PSC, MCRS			LCRSWC, PSSGC
Klamath	SONCCC	SONCCC		
Mendocino	SONCCC, SRWC, CVSC, CCC, NCS, CVS	SONCCC, SRWC		CVFC
Mount Baker Snoqualmie	PSC			PSSGC

Administrative Unit	Listed Species	Designated Critical Habitat	Proposed Critical Habitat	Candidate Species
Mount Hood	LCRC, LCRS, MCRS, UWRC			LCRSWC
Okanogan	UCRSC, UCRS,			
Olympic	PSC, HCSC			PSSGC, LCRSWC
Rogue River	SONCCC	SONCCC		
Six Rivers	SONCCC, CCC, NCS	SONCCC		
Siskiyou	SONCCC, OCC	SONCCC		OCS
Shasta-Trinity	SONCCC, CVSC, CVS	SONCCC		CVFC
Siuslaw	OCC			OCS
Umpqua	OCC			OCS
Wenatchee	UCRSC, UCRS, MCRS			
Willamette	UWRC, UWRS			
Arcata	SONCC, CCC, NCS, CCCS	SONCCC		
Coos Bay	SONCC, OCC	SONCCC		OCS
Eugene	UWRS, UWRC, OCC			OCS
King Range NCA	SONCC, CCC, NCS, CCCS	SONCCC		
Medford	SONCCC, OCC	SONCCC		OCS
Redding	SONCCC, CVWC, CVSC			CVFC
Roseburg	OCC			OCS
Salem	LCRS, UWRS, UWRC, CRC, OCC, LCRC			LCRSWC, OCS
Ukiah	CCC, CCCC, NCS	CCCC		

1.2.3 Action Area

50 CFR §402.02 defines action area as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the purpose of this Opinion, the action area includes those portions of the administrative units discussed above managed under the NWFP and within the range of anadromous salmonids and river reaches downstream of the administrative unit boundaries that may be affected by Federal land management activities covered by the subject RMPs.

1.2.4 Resource Management Plans

The RMPs generically authorize various categories of Federal actions responding to the needs for forest habitat, goods and services. While all of the USFS and BLM administrative units implement many of the same land-use practices, the levels of activities and outputs will vary depending on local conditions. Even though RMPs set important parameters for the authorization of specific projects, RMPs do not provide the final authorization for project implementation. Final authorization of projects depends on the analysis of site-specific effects, which includes a site-specific ESA consultation, NEPA analysis, and consistency with appropriate management direction (RMPs, ROD, and other laws). Effects of individual projects on ESA-listed species and designated critical habitat will be evaluated in future project-specific ESA section 7 consultations.

A complete description and analysis of the individual RMPs and management direction are provided in previous BAs prepared by the action agencies (USDA 1995a, 1995b, 1995c, 1995d, 2000; USDA and USDI 1997a, 1997b, 1998, 1999), and are hereby incorporated by reference. The subsequent opinions issued by NOAA Fisheries are listed in the consultation history, section 1.1 (Table 1), and are incorporated herein by reference (NOAA Fisheries 1996a, 1996b, 1997a, 1997b, 1997c, 1998a, 1998b, 1998c, 1998d, 1998e, 1999b, 2000a, 2000b, 2001). Management actions which are typically conducted on USFS and BLM lands include forest management, recreation, grazing, mining, watershed restoration, fish and wildlife habitat management, fire/fuels management, land exchanges and acquisitions, and a variety of special uses.

<u>Forest management</u> can be divided into two broad categories of activities: timber harvest and associated actions, and silvicultural treatments used to develop desirable stand characteristics. Timber harvest and associated actions can include road construction, landing construction, landing renovation and use, quarry operation, maintenance of existing roads, yarding and skidding logs, clear-cutting or thinning treatments, and salvage of dead or dying trees. Road maintenance actions include surface maintenance (blading), surface replacement, drainage maintenance and repair, vegetation management (brushing, limbing, seeding and mulching along roadways), slide repair, sign maintenance and repair, and replacement and repair of major structures (bridges and major culverts). Silvicultural treatments include planting; plantation maintenance and release (density management, pre-commercial thinning and control of competing vegetation); animal damage control; and fertilization.

<u>Recreational</u> actions provide for a wide range of developed and dispersed recreational opportunities. Developed recreation actions include campground maintenance, and recreation site and trail construction and maintenance. Dispersed activities include general public use of Federal lands (hunting, fishing, camping, hiking, *etc.*), environmental education, and management of off-highway vehicles.

<u>Range management</u> activities on Federal lands include livestock grazing, and rangeland improvements (fencing, water development, livestock handling facilities, and vegetation management).

<u>Mining activities</u> can be combined into two broad categories based on the method of extraction. Surface mining includes dredging and pit mining whereas underground mining utilizes tunnels or shafts to extract minerals. Activities associated with mining include roads and supporting structures and facilities.

<u>Watershed Restoration</u> actions on Federal lands are an integral part of management to aid in the recovery of fish habitat, riparian habitat, and water quality. Road decommissioning, culvert upgrades, riparian and stream habitat improvements, fish passage improvements, and riparian tree planting treatments are typical restoration actions.

Fish and wildlife management actions on Federal lands may include stream and riparian habitat surveys; surveys for fish (smolt traps, snorkeling, spawning ground counts, electro-fishing), amphibians, and 1994 ROD-identified survey and manage species, and wildlife habitat improvements (tree topping and falling).

Fire and fuels management actions include the suppression of wildfire and prescribed fire used to meet resource management objectives. Prescribed burning is used for fuels management for wildfire hazard reduction (under-burning), restoration of desired vegetation conditions, management of habitat and silvicultural treatments, *i.e.* site preparation (broadcast burning or pile burning). Pump chances, or water withdrawal sites, are created as water sources for fire suppression. Usually located next to roads, these sites are typically small, excavated ponds or short spurs for vehicle access to streams or lakes.

Land exchanges and acquisitions are made to benefit a variety of uses and values. Land tenure adjustments are made to improve public access, acquire important habitats or resources and improve the efficiency of managing Federal lands.

Forest products for domestic and commercial uses include firewood, mushrooms, ferns, boughs, mosses and similar products. USFS and BLM administrative units issue permits for the collection of these products.

Permits of many types are also issued by the USFS and BLM for the use of Federal lands. Permits may be issued for utility and power line corridors, communication sites, domestic and municipal water lines and diversions, and hydroelectric facilities. Road use permits are issued to allow for the transportation of commercial commodities on USFS and BLM managed roads. Road rights-of-way permits are issued to private individuals and companies for the construction and use of access roads across Federal lands.

1.2.5 Amended RMP Direction pursuant to the NWFP ROD

The 1994 ROD formally amended all existing USFS and BLM RMPs within the range of the northern spotted owl by the addition of new land allocations (1994 ROD, page 6-7), and Standards and Guidelines (S&Gs) (1994 ROD, Attachment A). These amendments generally override those in existing plans, except for any provisions of the existing plans that are more stringent in their protection (see ROD, pages 11-12). Additionally, some BLM and USFS administrative units have updated individual RMPs and incorporated the 1994 ROD land allocations, S&Gs, and other protective language and provisions. Table 5 lists the USFS and BLM administrative units in the NWFP area, the year each RMP was approved, and whether the ACS amended an existing RMP, or was incorporated into a revised RMP subsequent to the date of signing of the 1994 ROD.

The CRGNSA plan is different from the other RMPs in that it is not amended by and does not incorporate the NWFP. The CRGNSA management plan applies to all ownerships within the scenic area. The NF lands within the CRGNSA are governed by the RMPs of the Gifford

Pinchot and Mt. Hood NFs in Washington and Oregon, respectively, which were amended by the NWFP. However, those portions of these NFs within the CRGNSA are managed under the scenic area management plan, which provides more stringent protection and thus takes precedence over the RMP direction. For a complete description and analysis of the CRGNSA, see the March 23, 1999, addendum to the 1997 BA (USDA and USDI 1999), which describes protective measures on Federal and private land in the Proposed Action and Cumulative Effects sections, respectively.

1.2.6 Aquatic Conservation Strategy - Components and Objectives

A primary component of the NWFP is the Aquatic Conservation Strategy (ACS). The ACS was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The 1994 ROD states that the ACS is designed to protect salmon and steelhead habitat on Federal lands managed by the USFS and BLM within the range of Pacific Ocean anadromy.

Table 5. RMP Approval Date and Method by which the NWFP was Adopted by BLM and USFS Administrative Units within the NWFP Area.

		NWFP ACS	
Administrative Unit	**RMP Date**	**Amended**	**Incorporated**
Columbia River Gorge NSA	1992	See Gifford Pinchot and Mount Hood	
Deschutes	1990	X	
Gifford Pinchot	1990	X	
Klamath	1995		X
Lassen	1993	X	
Mendocino	1995		X
Modoc	1991	X	
Mount Baker Snoqualmie	1990	X	
Mount Hood	1990	X	
Okanogan	1989	X	
Olympic	1990	X	
Rogue River	1990	X	
Six Rivers	1995		X
Siskiyou	1989	X	
Shasta-Trinity	1995		X
Siuslaw	1990	X	
Umpqua	1990	X	
Wenatchee	1990	X	
Willamette	1990	X	
Winema	1990	X	
Arcata	1992	X	
Coos Bay	1995		X
Eugene	1995		X
King Range NCA	1974	X	
Klamath Falls	1995		X
Medford	1995		X

		NWFP ACS	
Administrative Unit	**RMP Date**	**Amended**	**Incorporated**
Redding	1993	X	
Roseburg	1995		X
Salem	1995		X
Ukiah	1984	X	

1.2.6.1 ACS Objectives

USFS and BLM-administered lands within the range of the Northern Spotted Owl are being managed to achieve the following nine ACS objectives:

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter

thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

1.2.6.2 ACS Components

To accomplish the stated objectives above, the ACS contains four components: (1) Riparian Reserves, (2) Key Watersheds, (3) Watershed Analysis (WA), and (4) Watershed Restoration. Specific standards and guidelines are associated with Riparian Reserves and Key Watersheds. All four of the ACS components are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems.

<u>Riparian Reserves</u>
Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special S&Gs apply. S&Gs prohibit and regulate activities in Riparian Reserves that may retard or prevent attainment of the ACS objectives. Riparian Reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecological processes that directly affect standing and flowing waterbodies such as lakes and ponds, wetlands, streams, stream processes, and fish habitats. Riparian Reserves occur at the margins of standing and flowing water, intermittent stream channels and ephemeral ponds, and wetlands. Riparian Reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecological processes.

Under the ACS, Riparian Reserves are used to protect, maintain and restore riparian structure and function of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed.

The Riparian Reserve widths are established based on ecological and geomorphic factors necessary to meet ACS objectives for different types of waterbodies. These widths are designed to provide a high level of fish habitat and riparian protection. The 1994 ROD (B-13) states that, although Riparian Reserve boundaries may be adjusted on permanently flowing streams, the prescribed widths are considered to approximate those necessary for attaining Aquatic Conservation Strategy objectives.

The Riparian Reserves, in combination with other withdrawn and reserve areas, and standards and guidelines will protect the overall ecosystem including the aquatic ecosystem. The total system of withdrawn and reserved areas, along with the specified standards and guidelines, would meet the need to protect the overall ecosystem while providing for other management opportunities (USDA and USDI 1994a, page F-62). The total system of Key Watersheds, along with Riparian Reserves and the specified standards and guidelines, will meet the need to protect the overall aquatic ecosystem while providing for other management opportunities. (USDA and USDI 1994a, page F-64).

WA will identify critical hillslope, riparian, and channel processes that must be evaluated in order to delineate Riparian Reserves and assure protection of riparian and aquatic functions. The prescribed Riparian Reserve widths could be modified in the future if a WA is completed, a site-specific analysis is conducted and described, and the rationale for modifying Riparian Reserve boundaries is presented through the appropriate NEPA decision-making process.

The prescribed widths of Riparian Reserves apply to all watersheds. Riparian Reserves, as described in detail on pages B-12 through B17 of the 1994 ROD, are specified for five categories of streams or waterbodies as follows:

Fish-bearing streams - Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year flood plain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.

Permanently flowing non-fish-bearing streams - Riparian Reserves consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year flood plain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest.

Constructed ponds and reservoirs, and wetlands greater than 1 acre - Riparian Reserves consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.

Lakes and natural ponds - Riparian Reserves consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance, whichever is greatest.

Seasonally flowing or intermittent streams (Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition, including ephemeral streams if they meet these two physical criteria)*, wetlands less than 1 acre, and unstable and potentially unstable areas* - This category applies to features with high variability in size and site-specific characteristics. At a minimum, the Riparian Reserves must include:

- The extent of unstable and potentially unstable areas (including earthflows);
- The stream channel and extending to the top of the inner gorge;
- The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation; and
- Extension from the edges of the stream channel to a distance equal to the height of one site-potential tree (site-potential tree height is the average maximum height of the tallest dominant trees [200 years or older] for a given site class), or 100 feet slope distance, whichever is greatest.

Key Watersheds

Refugia are a cornerstone of most species conservation strategies. They are designated areas that either provide, or are expected to provide, high quality habitat. A system of Key Watersheds that serve as refugia is crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. These refugia include areas of high quality habitat as well as areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have a high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program (see Watershed Restoration, below).

The ACS includes two designations for Key Watersheds. Tier 1 Key Watersheds (Aquatic Conservation Emphasis) contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a Watershed Restoration program. Tier 1 Key Watersheds consist primarily of watersheds identified previously by the Scientific Panel on Late-Successional Forest Ecosystems (Johnson *et al.* 1991), and in the Scientific Analysis Team Report (Thomas *et al.* 1993). The network of 143 Tier 1 Key Watersheds ensures that refugia are widely distributed across the landscape. While 21 Tier 2 (other) Key Watersheds may not contain at-risk fish stocks, they are important sources of high quality water (1994 ROD, pages B-18, 19).

Long-term management within Key Watersheds requires WA prior to further resource management activity. In the short term, until WA can be completed, minor activities such as those that would be categorically excluded under NEPA regulations (except timber harvest) may proceed if they are consistent with ACS objectives and apply Riparian Reserve S&Gs. Timber harvest, including salvage, can not occur in Key Watersheds without a WA. Key Watersheds that currently contain poor quality habitat are believed to have the best opportunity for successful restoration and will receive priority in any Watershed Restoration program (1994 ROD, pages B-18-19).

Roadless areas are an important component of Key Watersheds, aiding listed fish survival and recovery. Inventoried roadless areas are those that were originally designated under RARE II, and were expanded in scope with the 2001 Roadless Area Conservation Rule. To protect the remaining high quality habitats within Key Watersheds, the S&Gs for Key Watersheds instruct that no new roads will be built in remaining unroaded portions of roadless areas (1994 ROD, page C-7). WA is required in all Key Watersheds and all roadless areas prior to resource management (1994 ROD, page C-3). In addition, existing system and non-system road mileage is targeted for reduction for areas of Key Watersheds outside roadless areas. At a minimum there will be no net increase in roads in Key Watersheds. S&Gs specific to Key Watersheds are summarized on page C-7 of the 1994 ROD.

<u>Watershed Analysis</u>
The 1994 ROD states that WA focuses on implementing the ACS. WA is one of the principal analyses that will be used in making decisions on implementation of the ACS. It is required in Key Watersheds, for roadless areas in non-Key Watersheds, and Riparian Reserves prior to project decisions. Watershed analyses must be completed before initiating actions within a Key Watershed except minor activities such as those that would be categorically excluded under NEPA regulations (except timber harvest) may proceed if they are consistent with the RMP including S&Gs associated with relevant land allocations.

WA has a critical role in providing for aquatic and riparian habitat protection. In planning for ecosystem management and establishing Riparian Reserves to protect and restore riparian and aquatic habitat, overall watershed condition and the array of processes operating within the watershed need to be considered. Effective protection strategies for riparian and aquatic habitat on Federal lands must accommodate the wide variability in landscape conditions present across the Pacific Northwest. WA plays a key role in the ACS, ensuring that aquatic system protection is fitted to specific landscapes (1994 ROD, page B-20).

WA focuses on collecting and compiling information within the watershed that is essential for making sound management decisions. The results of watershed analyses may include a description of the resource needs, capabilities, opportunities, the range of natural variability, spatially explicit information that will facilitate environmental and cumulative effects analyses for NEPA, and the processes and functions operating within the watershed. WA will identify potentially disjunct approaches and conflicting objectives within watersheds. The information from WA is used to develop priorities for funding, and implementing actions and projects, and is used in developing monitoring strategies and objectives. The participation of adjacent landowners, private citizens, interest groups, industry, various government agencies, and others in watershed analyses is promoted.

WA consists of technically rigorous and defensible procedures designed to identify processes that are active within a watershed, how those processes are distributed in time and space, the current upland and riparian conditions of the watershed, and how all of these factors influence riparian habitat and other beneficial uses. The analysis is conducted by an interdisciplinary team consisting of geomorphologists, hydrologists, soil scientists, biologists and other specialists as needed. Information used in this analysis includes: maps of topography, stream networks, soils, vegetation, and geology; sequential aerial photographs; field inventories and surveys including landslide, channel, aquatic habitat, and riparian condition inventories; census data on species presence and abundance; water quality data; disturbance and land use history; and other historical data (*e.g.*, stream flow records, old channel surveys).

WA is organized as a set of modules that examine biotic and abiotic processes influencing aquatic habitat and species abundance (*e.g.*, landslides, surface erosion, peak and low stream flows, stream temperatures, road network effects, coarse woody debris dynamics, channel processes, fire, limiting factor analysis for key species). Results from these modules are integrated into a description of current upland, riparian, and channel conditions; maps of location, frequency, and magnitude of key processes; and descriptions of location and abundance of key species.

WA provides the contextual basis at the site level for decision makers to set appropriate boundaries of Riparian Reserves, plan land use activities compatible with disturbance patterns, design road transportation networks that pose minimal risk, identify what and where restoration activities will be most effective, and establish specific parameters and activities to be monitored. More detailed site-level analysis is conducted to provide the information and designs needed for specific projects (*e.g.*, road siting or timber sale layout) so that riparian and aquatic habitats are protected.

WA provides the ecological and geomorphic basis for changing the size and location of Riparian Reserves necessary to meet ACS objectives at the fifth-field watershed or broader scale and over the long term. Ultimate design of Riparian Reserves is likely to be a hybrid of decisions based on consideration of sites of special ecological value, slope stability, wildlife dispersal corridors, endemic species considerations, and natural disturbance processes.

<u>Watershed Restoration</u>
Watershed Restoration is an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. Restoration will be based on WA and planning. WA is essential to identify areas of greatest benefit-to-cost relationships for restoration opportunities and greatest likelihood of success. WA can also be used as a medium to develop cooperative projects involving various landowners. In many watersheds the most critical restoration needs occur on private lands downstream from federally-managed lands. WA, including the use of sediment budgets, provides a framework for considering benefit-to-cost relations in a watershed context. Thus, the magnitude of restoration needs within the planning area will be based on WA.

With reference to roads, restoration may range from obliteration or full decommissioning (closing and stabilizing a road to eliminate potential for storm damage and the need for maintenance) to simple road upgrading, which leaves the road open (1995 ROD, page B-31). The decision to apply a given treatment depends on the value and sensitivity of downstream uses, transportation needs, social expectations, assessment of probable outcomes for success at correcting problems, costs, and other factors. The magnitude of regional restoration needs will be based on WA.

Vegetative and silviculture programs are implemented to restore large conifers in Riparian Reserves, stabilize unstable areas, and thin densely-stocked stands. These practices can be implemented along with silvicultural treatments in uplands areas, although the practices will differ in objective and, consequently, design.

Instream restoration, based on the interpretation of physical and biological processes during WA, can be an important component of an overall program for restoring fish and riparian habitat. Instream restoration measures are inherently short term and, to be successful, must be accompanied by riparian and upslope restoration to achieve long-term Watershed Restoration. Instream restoration, including in-channel structures, are not to be used to mitigate for management actions that degrade existing habitat, as a substitute for habitat protection, or to justify risky land management activities and practices. Priority must be given to protecting existing high quality habitat (1994 ROD, B-31, 32).

1.2.6.3 Other Plan Components

<u>Fire Management Plans and Access Travel Management Plans</u>
Other plan components that could have the potential for beneficial or adverse effects to ESA-listed fish species are Fire Management Plans and Access Travel Management Plans. Fire Management Plans are particularly important in watersheds that contain ESA-listed fish species and where there is a high risk of high intensity, catastrophic fire. Many activity-specific S&Gs in the 1994 ROD address the need to reduce fuel loads and avoid risks of catastrophic fire. Typically these requirements are contained in sections of the S&Gs titled *Fire and Fuels Management* or *Fire Suppression and Prevention*.

Access Travel Management Plans should be important in reducing any redundancy in the existing road network within Key and non-Key Watersheds containing ESA-listed fish species. WA information should aid in completing Access Travel Management Plans.

<u>Monitoring and Adaptive Management Provisions</u>
Monitoring specific to achieving the stated objectives of the ACS, is discussed in the 1994 ROD (B-32, 33) and is an important component of management actions. General objectives of monitoring are: (1) Determine if Best Management Practices (BMP) have been implemented; (2) determine the effectiveness of management practices at multiple scales, ranging from individual sites to watersheds; and (3) validate whether ecosystem functions and processes have been maintained as predicted. In addition, monitoring will provide feedback to fuel the adaptive management process. Specific monitoring objectives will be derived from results of the WA and tailored to each watershed. Monitoring at the 20 to 200 square mile watershed level will link monitoring for ecosystem management objectives for multiple scales; province, river basin, smaller watershed and site-specific levels.

The 1994 ROD states that riparian area monitoring must be dispersed among the various landscapes rather than concentrated at a few sites and then extrapolated to the entire forest. Logistical and financial constraints require a stratified monitoring program that includes: postproject site review, reference to sub-drainages, basin monitoring, a water quality network, and landscape integration of monitoring data.

Long-term systematic monitoring in selected watersheds will be necessary to provide reference points for effectiveness and validation monitoring (1994 ROD, B-33). Reference watersheds, sub-basins, and individual sites have been selected as part of the overall adaptive management process described as part of these S&Gs. Study plans are cooperatively developed based on province, river basin, and/or watershed level analyses. Long-term data sets from reference watersheds will provide an essential basis for adaptive management and a gauge by which to assess trends in instream condition.

Monitoring is conducted and results will be documented, analyzed and reported by the agency or agencies responsible for land management in any particular watershed. Reports are reviewed by local interdisciplinary teams. In addition, water resource regulatory agencies may review results to determine compliance with appropriate standards, and province and river basin-level strategies. A cross-section of team members that includes participants from states and regulatory agencies should assess monitoring results and recommend changes in BMP or the mechanisms for BMP implementation.

1.2.6.4 Land Allocations

Pages 6 and 7 of the 1994 ROD are quoted below:

> This decision specifically incorporates seven land allocation categories, as set forth below. There is considerable overlap among some designated areas. For consistency and for acreage display purposes, lands subject to such overlaps are reflected in only one category, according to the order of land allocations in the following descriptions.
>
> <u>Congressionally-Reserved Areas</u> comprise 7,320,600 acres, representing 30% of the Federal land within the range of the northern spotted owl. These lands have been reserved by act of Congress for specific land allocation purposes. Th(e) decision can not and does not alter any of these congressionally mandated land allocations. Included in this category are National Parks and Monuments, Wilderness Areas, Wild and Scenic Rivers, National Wildlife Refuges, Department of Defense lands, and other lands with congressional designations.
>
> <u>Late Successional Reserves</u> comprise 7,430,800 acres, representing 30% of the Federal land within the range of the northern spotted owl. These reserves, in combination with the other allocations and standards and guidelines, will maintain a functional, interactive, late successional and old-growth forest ecosystem. They are designed to serve as habitat for late-successional and old-growth related species including the northern spotted owl.
>
> <u>Adaptive Management Areas</u> (AMAs) comprise 1,521,800 acres, representing 6% of the Federal land within the range of the northern spotted owl. These areas are designed to

develop and test new management approaches to integrate and achieve ecological, economic, and other social and community objectives. The Forest Service and BLM will work with other organizations, government entities and private landowners in accomplishing those objectives. Each area has a different emphasis to its prescription, such as maximizing the amount of late-successional forests, improving riparian conditions through silvicultural treatments, and maintaining a predictable flow of harvestable timber and other forest products. A portion of the timber harvest will come from this land. There are ten adaptive management areas.

<u>Managed Late Successional Areas</u> currently comprise 102,200 acres, representing 1% of the Federal land within the range of the northern spotted owl. These lands are either: (1) Mapped managed pair areas, or (2) unmapped protection buffers. Managed pair areas are delineated for known northern spotted owl activity centers. Protection buffers are designed to protect certain rare and locally endemic species.

<u>Administratively-Withdrawn Areas</u> comprise 1,477,100 acres, representing 6% of the Federal lands within the range of the northern spotted owl. Administratively withdrawn areas are identified in current forest and district plans or draft plan preferred alternatives and include recreational and visual areas, back country, and other areas not scheduled for timber harvest.

<u>Riparian Reserves</u> initially comprise 2,627,500 acres, representing 11% of the Federal lands within the range of the northern spotted owl (acreage subject to change following WA). However, because the calculation of Riparian Reserve acreage is done after all other designated areas, the acreage shown reflects only that portion of Riparian Reserves that is interspersed throughout the matrix. In fact, approximately 40% of Federal acres in the NWFP area is within Riparian Reserves, including the Matrix land allocation. Riparian Reserves are areas along all streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis. The main purpose of the reserves is to protect the health of the aquatic system and its dependent species; the reserves also provide incidental benefits to upland species. These reserves will help maintain and restore riparian structures and functions, benefit fish and riparian-dependent non-fish species, enhance habitat conservation for organisms dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for terrestrial animals and plants, and provide for greater connectivity of late-successional forest habitat.

<u>Matrix</u> comprises 3,975,300 acres, representing 16% of the Federal land within the range of the northern spotted owl. The matrix is the Federal land outside the six categories of designated areas set forth above. It is also the area in which most timber harvest and other silvicultural activities will be conducted. However, the matrix does contain non-forested areas as well as forested areas that may be technically unsuited for timber production.

1.2.6.5 Standards and Guidelines

The detailed requirements that describe how land managers should treat the forest lands within the range of the northern spotted owl are described in Attachment A, particularly section C of the 1994 ROD. Some standards and guidelines apply to all lands, others to a specific land allocation. More than one set of standards and guidelines may apply in some areas, for instance, Riparian Reserve requirements within a Late-Successional Reserve. In such cases, the more restrictive standards and guidelines generally apply (1994 ROD, pages 7-10).

Some standards and guidelines contain an initial implementation strategy that may differ in some respects from the long-term strategy. The following summaries briefly describe the major standards and guidelines. For a more comprehensive description of requirements, see section C of Attachment A of the 1994 ROD.

<u>Key Watersheds</u>
Key Watersheds overlay all six categories of designated areas and matrix, and place additional management requirements or emphasis on activities in those areas. Within Key Watersheds, no new roads will be built in remaining unroaded portions of inventoried (RARE II) roadless areas. Also, system and non-system road milage will be reduced outside of roadless areas, or, if funding is not sufficient to reduce milage, there will be no net increase in the amount of roads in Key Watersheds. Key Watersheds are highest priority for restoration. WA is required prior to management activities, except for minor activities such as those categorically excluded under NEPA (and not including timber harvest). WA is required prior to timber harvest.
<u>Late-Successional Reserves</u>
Late-successional reserves are to be managed to protect and enhance old-growth forest conditions. For each Late-Successional Reserve (or group of small reserves) managers should prepare an assessment of existing conditions and appropriate activities. No programmed timber harvest is allowed inside the reserves. However, thinning or other silvicultural treatments inside these reserves may occur in stands up to 80 years of age if the treatments are beneficial to the creation and maintenance of late-successional forest conditions. In the reserves east of the Cascades and in Oregon and California Klamath Provinces, additional management activities are allowed to reduce risks of large-scale disturbance. Salvage guidelines are intended to prevent negative effects on late successional habitat. Non-silvicultural activities within Late-Successional Reserves are allowed where such activities are neutral or beneficial to the creation and maintenance of late-successional habitat. Thinning or other silvicultural activities must be reviewed by the Regional Ecosystem Office and the Regional Interagency Executive Committee.

<u>Adaptive Management Areas</u>
Where congressionally-reserved areas or Late-Successional Reserves occur within adaptive management areas, the amended plans will apply the more restrictive standards and guidelines of the congressionally-reserved areas or late successional reserves; however, within the Finney and Northern Coast Range AMAs, the Late-Successional Reserve designations may be changed by AMA plans. Standards and guidelines for Riparian Reserves and Key Watersheds in adaptive

management areas may allow more flexibility. AMA planning groups will closely coordinate with the Regional Ecosystem Office.

<u>Managed Late-Successional Areas</u>
Managed owl pair areas are typically on the east side of the Cascade Range. Suitable owl habitat in areas surrounding owl activity centers will be maintained through time using various management techniques. The location of this acreage may change over time. Protocols will be developed for the location of special protection areas.

<u>Administratively-Withdrawn Areas</u>
These areas have already been designated in existing plans. The amended plans will apply the most restrictive applicable standards and guidelines, whether from Attachment A or from existing plans.

<u>Riparian Reserves</u>
Riparian Reserve standards and guidelines prohibit or regulate activities in Riparian Reserves. WA and appropriate NEPA compliance is required to change Riparian Reserve boundaries in all watersheds.

<u>Matrix</u>
Most of the timber harvest will occur on Matrix lands. Standards and guidelines assure appropriate conservation of ecosystems as well as provide habitat for rare and lesser-known species. Some of the major standards and guidelines for matrix lands are: a renewable supply of large down logs must be in place; at least 15% of the green trees on each regeneration harvest unit located on National Forest land must be retained (except within the Oregon Coast Range and Olympic Peninsula provinces); and 100 acres of late-successional habitat around owl activity centers that were known as of January 1, 1994, must be protected.

1.2.7 2003 Proposed Amendment to the NWFP

The Secretaries of Agriculture and the Interior are proposing to amend the ACS portions of the RMPs (Except for the CRGNSA, see section 1.2.2, above) within the NWFP area. The potential effects of the preferred alternative of the Final Supplemental Environmental Impact Statement for the proposed amendment (USDA and USDI 2003a) is assessed and evaluated in the BA, along with the effects of implementation of the RMPs subsequent to previous ESA consultations. All RMPs for USFS and BLM administrative units within the NWFP area would be amended under the Proposed ACS amendment. Management of the Coquille Forest is also affected. ACS implementation issues addressed in the proposed amendment were further clarified in the ROD, as discussed in the March 17, 2004, letter from the USFS and BLM (USDA and USDI 2004). The ROD language discussed in the March 17, 2004, letter does not affect or otherwise invalidate the analysis in the October 2, 2003, BA.

The amendment clarifies that:

1. The proper scales for Federal land managers to evaluate progress toward achievement of the ACS objectives are the watershed and broader scales.

2. No single project should be expected to achieve all ACS objectives.

3. Decision makers must design projects to follow the ACS.

4. Project records must contain evidence that projects comply with relevant S&Gs in Sections C and D of Attachment A in the NWFP ROD.

5. Project record will also demonstrate how the agency used relevant information from applicable WA to provide context for project planning.

6. References to ACS objectives in the S&Gs in Sections C and D do not require that decision makers find that site-scale projects, in themselves, will fully attain ACS objectives.

In addition to all components of the ACS, the amendment retains the ACS objectives, and reinforces concepts about appropriate scales of analysis and the role of S&Gs.

The amendment also clarifies that WA is not a decision-making process in and of itself. This principle is emphasized in the 1994 ROD, the Final SEIS (USDA and USDI 1994a), and the 1995 *Federal Guide for Watershed Analysis* (USDA *et al.* 1995).

Under the amendment, land managers continue to be required to design projects to comply with applicable standards and guidelines (S&Gs) in sections C and D of Attachment A of the ROD, and other applicable standards in RMPs. In this way, consistency with the ACS is established, and no further finding of ACS consistency is required.

The action would not result in a significant change to any RMP, nor would it alter objectives or multiple-use goals. The action would not adjust management area boundaries. The amendment does not change the goals of the 1994 NWFP ROD. All components of the ACS (Riparian Reserves, Key Watersheds, WA, and Watershed Restoration) remain in place. The amendment emphasizes a concept from the Forest Ecosystem Management Assessment Team (1993) Chapter V, and the 1994 ROD, Page B-12 (BA, page 60):

> "Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of Aquatic Conservation Strategy objectives."

The preferred alternative in the 2003 ACS EIS proposes specific changes to language on pages B-9, B-10, and C-31 of the 1994 ROD. That new language, and complementary ROD language as described in the March 17, 2004 letter from the USFS and BLM follows below:

Page B-9 Paragraph 6 to Page B-10 Paragraph 1 is deleted in its entirety.

Page B-10

"The four components of the Aquatic Conservation Strategy (Riparian Reserves, Key Watersheds, WA, and Watershed Restoration), in combination with application of relevant standards and guidelines in sections C and D (and other relevant standards in RMPs) are intended to achieve Aquatic Conservation Strategy Objectives.[1]

The 2004 ROD states that the objectives "... are intended to be met through the four components of the Aquatic Conservation Strategy...." and clarifies that the objectives "... apply only at fifth-field watershed and larger scales..." and that achieving these objectives "... will take decades or longer, and the effectiveness of the Strategy can only be assessed over that amount of time."

"Under the Aquatic Conservation Strategy, the agencies must maintain existing conditions or implement actions to restore conditions at the fifth-field watershed scale over the long term. No management activities can be expected to maintain the existing condition at all scales and all times; disturbance from management activities must be considered in the context of the condition of the fifth-field watershed as a whole."[2]

The 2004 ROD removes language on page B-10 addressing requirements to "...maintain existing conditions or implement actions to restore conditions at the fifth-field watershed scale over the long term." However, the 2004 ROD, retains those standards and guidelines on C-32 thru C-38 that include direction to "meet," "not adversely affect," "not retard or prevent attainment of" or otherwise achieve ACS objectives. The 2004 ROD further clarifies that a project within Riparian Reserves is consistent with Riparian Reserve standards and guidelines on pages C-31 thru C-38 "... if the decision maker determines from the record that the project is designed to contribute to maintaining or restoring the fifth-field watershed over the long term, even if short-term effects may be adverse."

"The project record will demonstrate how the agency used relevant information from applicable Watershed Analysis to provide context for project planning, recognizing that Watershed Analysis is not a decision-making process in and of itself, nor is WA a decision document. If WA is not required or available, or does not contain relevant

[1] Federal agencies may not be able to attain objectives within watersheds with relatively low proportions of Federal lands (see Northwest Forest Plan FSEIS page 3&4-82).

[2] The Federal Guide for Watershed Analysis (1995) discusses issues of scale and explains why the fifth-field watershed scale "satisfies many needs and offers a consistent format for reporting results of an analysis." The Federal Guide states that analysis at the watershed scale "provides the context for management through the description and understanding of specific ecosystem conditions and capabilities."WA requirements are described later in Section B. All other requirements and uses of WA described on pages B-20 through B-30 of the ROD would remain unchanged.

information, the project record will provide evidence that project effects were considered relative to the watershed condition."

The 2004 ROD states, on pages B-10 and C-31 that "The record for a project within a Riparian Reserve must: 1) describe the existing condition, including the important physical and biological components of the fifth-field watershed(s) in which the project area lies; 2) describe the effect of the project on the existing condition; and 3) demonstrate that in designing and assessing the project the decision maker considered and used, as appropriate, any relevant information from applicable watershed analysis. "

"Projects should be designed to comply with applicable standards and guidelines in Sections C and D (and other applicable standards in Resource Management Plans). No further finding of ACS consistency is required."

The 2004 ROD amplifies this concept and clarifies that "Decision makers are not able or required to assess the contribution of a site-specific project to achieving Aquatic Conservation Strategy Objectives. The Aquatic Conservation Strategy Objectives are not to be interpreted as standards and guidelines applicable to individual projects."
"To comply with Riparian Reserve standards and guidelines that reference ACS objectives, the decision maker must document that analysis has been completed, including a description of the existing condition, a description of the range of natural variability of the important physical and biological components of a given fifth-field watershed, and how the project or management action maintains the existing condition or restores it toward that range of natural variability."[3]

The 2004 ROD states on pages B-10 and C-31, that "The record for a project within a Riparian Reserve must: 1) describe the existing condition, including the important physical and biological components of the fifth-field watershed(s) in which the project area lies; 2) describe the effect of the project on the existing condition; and 3) demonstrate that in designing and assessing the project the decision maker considered and used, as appropriate, any relevant information from applicable watershed analysis. The record will address these items at a level of detail in proportion to the project."

Page C-31, Second Paragraph under Heading Standards and Guidelines:

"As a general rule, standards and guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves that may retard or prevent attainment of the Aquatic Conservation Strategy objectives at the 5th field watershed scale over the long term. WA and appropriate NEPA compliance is required to change Riparian Reserve boundaries in all watersheds."

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[3] The Federal Guide for WA discusses Range of Natural Variability on page 20.

The 2004 ROD states that “As a general rule, standards and guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves. Watershed analysis and appropriate NEPA compliance is required to change Riparian Reserve boundaries in all watersheds.”

“To comply with Riparian Reserve standards and guidelines that reference ACS objectives, the decision maker must complete an analysis that includes a description of the existing condition, a description of the range of natural variability of the important physical and biological components of a given 5th field watershed, and how the project or management action maintains the existing condition or restores it toward that range of natural variability.”

The 2004 ROD clarifies this concept by stating that “The project is consistent with Riparian Reserve standards and guidelines on pages C-31 - C-38 of this attachment that include direction to ‘meet,’ ‘not adversely affect,’ ‘not retard or prevent attainment of” or otherwise achieve ACS objectives, if the decision maker determines from the record that the project is designed to contribute to maintaining or restoring the fifth-field watershed over the long term, even if short-term effects may be adverse.”

1.2.8 Current Processes Used by the Action Agencies that Contribute to a Multi-Scale Understanding of Effects

Appendix 1 of the BA (included by reference) describes the process whereby the action agencies assess and mitigate the effects of land management activities at a variety of scales. In addition to project-level NEPA analysis, project-level Magnuson-Stevens Fishery Conservation and Management Act (MSA) consultation, analysis to obtain permits, and monitoring and inventory, this appendix also includes a detailed discussion of the process that the action agencies apply to project-level section 7 ESA consultations, which is summarized below. Appendix 1 of the BA is considered to be part of the proposed action being evaluated in this Opinion.

Federal agencies are required to comply with section 7 of the ESA. ESA consultation takes place when there are proposed or listed species or designated/proposed critical habitat present. The action agencies consult with NOAA Fisheries when actions may affect listed species or their designated critical habitats.

The action agencies have internal guidance and regulatory requirements and follow the implementating regulations (Code of Federal Regulations) in preparing biological assessments (BAs). The BAs also conform to analytical process formats developed by the USFWS and NOAA Fisheries. The current formats evaluate effects to listed species or critical habitat at a variety of scales, from site to watershed, by habitat indicators. The determination of effects is dependent upon specific site and watershed physical and biological baseline conditions for a proposed action and the design and anticipated effects of the action itself. The four agencies (Fish and Wildlife Service, NOAA Fisheries, BLM and USFS) have developed a draft analytical procedure for section 7 ESA consultation on listed fish species and critical habitat that is currently being evaluated on several test projects. It assesses impacts at multiple scales, from site to watershed. Key features of the draft analytical procedure are:

1. Integration of the use of WA results, the NEPA analysis, and the ESA consultation process;

2. Specific identification and documentation of effects relative to the element of the proposed action that is causing it, and what life history stage of the fish is being affected;

3. A requirement to address eight factors of each effect (nature, proximity, timing, duration, probability, frequency, distribution, and magnitude);

4. Tracking of effects, on the landscape, of previous Federal actions and current proposed actions to determine aggregated effects, at the scale of watersheds.

The four agencies conduct ESA consultation using the "Streamlined Consultation Procedures for Section 7 of the Endangered Species Act" (USDA *et al,* 1993), which is an interagency agreement. It established a hierarchy of teams from project-level consultation teams, known as Level 1 teams, to higher level teams for elevations of disputes. The Level 1 teams evaluate BAs and effect determinations. If formal consultation is required, the teams establish terms and conditions to be included in the respective incidental take statements accompanying the biological opinions. The terms and conditions are mandatory requirements that the action agencies must follow. The regulatory agencies are encouraged to participate in early phases of project development. This can result in design changes to projects to address environmental concerns.

A potential outcome of ESA consultation is a "jeopardy" determination and/or a finding of "adverse modification" of critical habitat. However, these are expected to be rare because the streamlining process and the requirements of the action agencies to follow multiple laws, policies, standards and guidelines in the RMPs, and to respond to public comments, resolve protests and appeals during the NEPA process. Generally projects that would jeopardize listed species or result in adverse modification of critical habitat would not move forward to ESA consultation. Instead, a jeopardy or adverse modification finding would result in modification of project designs.

"Project Design Criteria" are also a feature of some ESA consultations. Action agencies identify design "sideboards" in discussions with their Level 1 team regulatory agency counterparts to minimize adverse effects of actions to listed fish or critical habitat. Design criteria are often developed for programmatic consultations, where entire programs of work (such as road maintenance or habitat restoration) are consulted on as a whole.

The process for ESA consultation discussed in the BA Appendix, including a description of the draft analytical framework, integrates the WA aspect of the ACS with NEPA and project-level

ESA consultation. This will result in a thorough understanding of environmental impacts and ESA effects at scales ranging from site to watersheds.

Additionally, project-level consultations will address potential aggregated actions arising from contemporaneous Federal actions within the same watersheds by including such effects in project-level consultations, tracking the timing, nature, and duration of such effects, and accounting for such impacts in subsequent project-level consultations by updating environmental baselines.

Appendix 1 of the BA concludes that the design of projects has been, and will continue to be driven by the goals of the NWFP and shaped by land allocations, S&Gs, context provided by relevant information from WA, NEPA analysis (including public participation), site-specific BMPs, and the results of the streamlining consultation process during ESA consultation. Projects requiring permits undergo additional analysis and review by other Federal and state agencies that may result in design changes. Decision makers will continue to document that projects are consistent with RMPs and therefore the ACS, which is integrated into them. Project implementation will continue to be in accordance with NEPA decisions and, where formal ESA consultation is required, with the terms and conditions of the incidental take statements accompanying the project-level biological opinions.

Monitoring and project administration will continue to evaluate whether or not projects were implemented as designed in accordance with S&Gs, BMPs, and with contract specifications, and whether or not they are effective in meeting project goals. The Aquatic and Riparian Effectiveness Monitoring Program (AREMP) will ultimately provide an assessment of whether the ACS is effective across the NWFP. In the short term, project level monitoring, research results, and annual implementation monitoring will provide information on the impacts and conformance with existing requirements (*e.g.*, S&Gs) for Federal land management agency projects. This information will be used for future project design and administration to minimize adverse environmental impacts and ESA effects.

1.2.9 Non-NWFP Areas

Three non-NWFP areas governed with the NWFP ACS have special circumstances that warrant consideration in this Opinion. Those circumstances are discussed below for Mendocino NF, Wenatchee NF and Coquille Forest.

1.2.9.1 Mendocino NF

The Mendocino National Forest is located entirely within the NWFP area except for the Lake Red Bluff Recreation area which is located adjacent to the Sacramento River in the City of Red Bluff. This area is about 490 acres and includes campgrounds, trails, boat ramps, a fish ladder operated by the USFWS, and a non-profit Sacramento River Discovery Center. Various recreation activities are the primary use of the area. The most intensive use of the river occurs during boat racing and water skiing events that are covered under a special use permit. The

RMP ROD stated that the NWFP ACS would be incorporated on the entire forest including the Lake Red Bluff area.

1.2.9.2 Wenatchee NF

There are approximately 25,000 acres or about 1% of the Wenatchee NF area that is outside the range of the Northern spotted owl and technically would not be under the NWFP. These lands are within the PACFISH ACS area but the Wenatchee NF RMP was not amended by the PACFISH decision notice. These lands are primarily along the Columbia River Breaks with other small parcels in the lower Wenatchee, Tieton and Naches watersheds. The lands are very dry with few perennial streams let alone fish habitat. The Wenatchee NF is managing these lands using NWFP ACS, specifically the S&Gs for the Riparian Reserves and WA to guide management. The Forest Supervisor has committed to the continued management of these lands under the NWFP ACS in a letter addressed to the Forest Service Columbia River Basin PACFISH coordinator dated July 1, 1999.

1.2.9.3 Coquille Forest

The proposed action also affects management of the Coquille Forest. These lands are owned by the Coquille Indian Tribe, are part of the Coquille Indian Reservation, and are held in trust by the United States. An Act of Congress in 1996 transferred ownership of about 5,400 acres of Federal land within the NWFP to the Coquille Indian Tribe. The Act required that Coquille Forest comply with the adjacent Coos Bay BLM District Resource Management Plans. The Coquille Forest is affected by this proposed amendment to the Coos Bay BLM Resource Management Plan.

2. ENDANGERED SPECIES ACT

2.1 Biological Information and Status of the Species

NOAA Fisheries' first step in applying the ESA standards of section 7 (a)(2) to listed salmon and steelhead is to define those species' biological requirements that are most relevant to each consultation. NOAA Fisheries finds that these biological requirements are best expressed in terms of environmental factors that define properly functioning freshwater aquatic habitat necessary for the survival and recovery of salmon and steelhead. Individual environmental factors include water quality, habitat access, physical habitat elements, river channel condition, and hydrology. Properly functioning watersheds, where all of the individual factors operate together to provide healthy aquatic ecosystems, are also necessary for the survival and recovery of these species.

2.1.1 Affected ESUs

2.1.1.1 Chinook Salmon

Biological Requirements and Life History

The status of chinook salmon from Washington, Idaho, Oregon and California was reviewed by Myers *et. al.* (1998) and updated by NMFS (2003a). This information is summarized below, and information sources cited in those documents are included here by reference.

Of the Pacific salmon, chinook salmon exhibit arguably the most diverse and complex life history strategies. Sixteen age categories for chinook salmon have been described, 7 total ages with 3 possible freshwater ages. Two generalized freshwater life-history types are described: “stream-type” chinook salmon reside in freshwater for a year or more following emergence, whereas “ocean-type” chinook salmon migrate to the ocean within their first year.

Chinook salmon mature between 2 and 6+ years of age. Freshwater entry and spawning timing are generally thought to be related to local water temperature and flow regimes. Runs are designated on the basis of adult migration timing; however, distinct runs also differ in the degree of maturation at the time of river entry, thermal regime and flow characteristics of their spawning site, and actual time of spawning.

Run timing for spring-run chinook salmon in this typically begins in March and continues through July, with peak migration occurring in May and June. Spawning begins in late August and can continue through October, with a peak in September. Historically, spring-run spawning areas were located in the river headwaters (generally above 400 m). Run timing for fall-run chinook salmon varies depending on the size of the river. Adult Rogue, Upper Klamath, and Eel River fall chinook salmon return to freshwater in August and September and spawn in late October and early November. In other coastal rivers and the lower reaches of the Klamath River, fall-run freshwater entry begins later in October, with peak spawning in late November and December, often extending into January. Late-fall or "snow" chinook salmon from Blue Creek, on the lower Klamath River, were described as resembling the fall-run fish from the Smith River in run and spawning timing, as well as the degree of sexual maturation at the time of river entry.

Upon entering freshwater, spring-run chinook salmon are immature and must stage for several months before spawning. Gonads mature during the summer holding period in freshwater. Over-summering adults require cold-water refuges such as deep pools to conserve energy for gamete production, redd construction, spawning, and redd guarding. The upper limit of the optimal temperature range for adults holding while eggs are maturing is 59° F to 60° F . The upper preferred water temperature for spawning adult chinook salmon is 55° F to 57° F. Unusual stream temperatures during spawning migration and adult holding periods can alter or delay migration timing, accelerate or retard mutations, and increase fish susceptibility to diseases. Sustained water temperatures above 80.6° F are lethal to adults.

Spring-run chinook salmon eggs generally incubate between October to January, and fall-run chinook salmon eggs incubate between October and December. Length of time required for eggs to develop and hatch is dependant on water temperature and is quite variable, typically ranging from 3-5 months. The optimum temperature range for chinook salmon egg incubation is 44° F to 54° F. Incubating eggs show reduced egg viability and increased mortality at temperatures greater than 58° F and show 100% mortality for temperatures greater than 63° F. Chinook salmon embryos exposed to water temperatures of 35° F or less before the eyed stage experienced 100% mortality. Emergence of spring- and fall-run chinook salmon fry begins in December and continues into mid-April. Fry use woody debris, interstitial spaces in cobble substrates, and undercut banks as cover. As the fry grow, habitat preferences change. Juveniles move away from stream margins and begin to use deeper water areas with slightly higher water velocities.

Post-emergent fry seek out shallow, nearshore areas with slow current and good cover, and begin feeding on small terrestrial and aquatic insects and aquatic crustaceans. As they grow to 50 to 75 mm in length, the juvenile salmon move out into deeper, swifter water, but continue to use available cover to minimize the risk of predation and reduce energy expenditure. The optimum temperature range for rearing chinook salmon fry is 50° F to 55° F and for fingerlings is 55° F to 60° F.

Ocean-type juveniles enter saltwater during one of three distinct phases. "Immediate" fry migrate to the ocean soon after yolk resorption at 30-45 mm in length. In most river systems, however, fry migrants, which migrate at 50 to 150 days post-hatching, and fingerling migrants, which migrate in the late summer or autumn of their first year, represent the majority of ocean-type emigrants. Stream-type chinook salmon migrate during their second or, more rarely, their third spring. Under natural conditions stream-type chinook salmon appear to be unable to smolt as subyearlings.

The diet of out migrating ocean-type chinook salmon varies geographically and seasonally, and feeding appears to be opportunistic. Aquatic insect larvae and adults, *Daphnia*, amphipods (*Eogammarus* and *Corophium spp*.), and *Neomysis* have been identified as important food items.

Juvenile stream- and ocean-type chinook salmon have adapted to different ecological niches. Ocean-type chinook salmon tend to utilize estuaries and coastal areas more extensively for juvenile rearing. In general, the younger (smaller) juveniles are at the time of emigration to the estuary, the longer they reside there. Stream-type juveniles are much more dependent on freshwater stream ecosystems because of their extended residence in these areas. A stream-type life history may be adapted to those watersheds, or parts of watersheds, that are more consistently productive and less susceptible to dramatic changes in water flow, or which have environmental conditions that would severely limit the success of subyearling smolts.

In preparation for their entry into a saline environment, juvenile salmon undergo physiological transformations known as smoltification that adapt them for their transition to salt water. These transformations include different swimming behavior and proficiency, lower swimming stamina, and increased buoyancy that also make the fish more likely to be passively transported by currents. In general, smoltification is timed to be completed as fish are near the fresh water to salt water transition. Too long a migration delay after the process begins is believed to cause the fish to miss the “biological window” of optimal physiological condition for the transition. The optimal thermal range for chinook during smoltification and seaward migration is 50° F to 55° F.

Chinook salmon spend between one and four years in the ocean before returning to their natal streams to spawn.

Status and Population Trends

The status of chinook salmon from Washington, Idaho, Oregon and California (Myers et. al. 1998, NOAA Fisheries 2003) is summarized below by ESU.

California Coastal Chinook

Escapement of this ESU was estimated at 73,000 fish, predominantly in the Eel River (55,500) with smaller populations in; Redwood Creek, Mad River, Mattole River (5,000 each), Russian River (500), and several small streams in Del Norte and Humboldt Counties.

Within this ESU, recent abundance data vary regionally. Dam counts of upstream migrants are available on the South Fork Eel River at Benbow Dam from 1938 to 1975. Counts at Cape Horn Dam, on the upper Eel River are available from the 1940s to the present, but they represent a small, highly variable portion of the run. No total escapement estimates are available for this ESU, although partial counts indicate that escapement in the Eel River exceeds 4,000.

Data available to assess trends in abundance are limited. Recent trends have been mixed, with predominantly strong negative trends in the Eel River Basin, and mostly upward trends elsewhere. Previous assessments of stocks within this ESU have identified several as being at risk or of concern. Nehlsen *et al*. (1991) identified seven stocks as at high extinction risk and seven stocks as at moderate extinction risk. Higgins *et al*. (1992) provided a more detailed analysis of some of these stocks, and identified nine chinook salmon stocks as at risk or of concern. Four of these stock assessments agreed with the Nehlsen *et al*. (1991) designations, while five fall-run chinook salmon stocks were either reassessed from a moderate risk of extinction to stocks of concern (Redwood Creek, Mad River, and Eel River) or were additions to the Nehlsen *et al*. (1991) list as stocks of special concern (Little and Bear rivers). In addition, two fall-run stocks (Smith and Russian Rivers) that Nehlsen *et al*. (1991) listed as at moderate extinction risk were deleted from the list of stocks at risk by Higgins *et al*. (1992), although the USFWS reported that the deletion for the Russian River was due to a finding that the stock was extinct.

Central Valley Spring-run Chinook Salmon

Historically, spring-run chinook salmon were predominant throughout the Central Valley, occupying the upper and middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit rivers, with smaller populations in most other tributaries with sufficient habitat for over-summering adults. The Central Valley drainage as a whole is estimated to have supported spring-run chinook salmon runs as large as 600,000 fish between the late 1880s and 1940s (CDFG 1998). Before the construction of Friant Dam, nearly 50,000 adults were counted in the San Joaquin River (Fry 1961). Following the completion of Friant Dam, the native population from the San Joaquin River and its tributaries was extirpated. Spring-run chinook salmon no longer exist in the American River due to the existence and operation of Folsom Dam.

Natural spawning populations of Central Valley spring-run chinook salmon are currently restricted to accessible reaches in the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (CDFG 1998; USFWS, unpublished data). With the exception of Butte Creek and the Feather River, these populations are relatively small, ranging from a few fish to several hundred. Butte Creek returns in 1998 and 1999 numbered approximately 20,000 and 3,600, respectively (CDFG unpublished data). On the Feather River, significant numbers of spring-run chinook, as identified by run timing, return to the Feather River Hatchery. However, coded-wire-tag information from these hatchery returns indicates substantial introgression has occurred between fall-run and spring-run chinook populations in the Feather River due to hatchery practices.

Throughout its range, this ESU suffers from loss of most historic spawning habitat, degradation of remaining habitat, and genetic threats from the Feather River Hatchery spring chinook program. Central valley spring chinook require cool water while they mature in freshwater over the summer. In the Central Valley, summer water temperatures are suitable for chinook salmon only above 150-500m elevation, and most such habitat in the ESU is now behind impassable dams.

The Feather and Yuba Rivers contain populations thought to be significantly influenced by the Feather River Hatchery (FRH) spring chinook stock. The FRH spring chinook program releases its production far downstream of the hatchery, causing high rates of straying (CDFG 2001). There is concern that fall and spring chinook have hybridized in the hatchery. The Biological Review Team (BRT) viewed FRH as a major threat to the genetic integrity of the remaining wild spring chinook populations.

Sacramento River Winter-run Chinook Salmon

Historically, the winter run chinook salmon was abundant in the McCloud, Pit, and Little Sacramento rivers. Construction of Shasta Dam in the 1940s eliminated access to all of the historic spawning habitat for winter-run chinook salmon in the Sacramento River Basin. It was not expected that winter chinook would survive this habitat alteration (Moffett 1949). However, cold water releases from Shasta Dam have created conditions suitable for winter chinook for roughly 100 km downstream from the dam (NOAA Fisheries 2003b). Since then, the ESU has been reduced to a single spawning population confined to the mainstem Sacramento River below Keswick Dam; although some adult winter-run chinook have been observed in Battle Creek, tributary to the upper Sacramento River in recent years. The fact that this ESU is generally comprised of a single population with very limited spawning and rearing habitat increases its risk of extinction due to local catastrophe or poor environmental conditions. There are no other natural populations in the ESU to buffer it from natural fluctuations.

Besides the construction of Shasta Dam, Sacramento River Winter-run chinook face other threats including inadequately screened water diversion, predation at artificial structures and by nonnative species, overfishing, pollution from Iron Mountain mine (among other sources), adverse flow conditions, high summer water temperatures, unsustainable harvest rates, passage problems at various strictures (especially, until recently, Red Bluff Diversion Dam), and vulnerability to drought (NOAA Fisheries 2003b).

Quantitative estimates of run-size are not available for the period prior to the completion of Red Bluff Diversion Dam in 1966. CDFG estimated spawning escapement of Sacramento River winter-run chinook salmon at 61,300 (60,000 mainstem, 1,000 in Battle Creek, and 300 in Mill Creek) in the early 1960s. During the first three years of operation of the counting facility at Red Bluff Diversion Dam (1967 to 1969), the spawning run of winter-run chinook salmon averaged 86,500 fish. From 1967 through the mid-1990s, the population declined at an average rate of 18% per year, or roughly 50% per generation. The population reached critically low levels during the drought of 1987 to 1992; the three-year average run size for period of 1989 to 1991 was 388 fish. However, the trend in the past five years indicates the population may be increasing.

Upper Columbia River Spring Chinook

All three of the existing upper Columbia River spring chinook populations (Wenatchee, Methow and Entiat Rivers) have exhibited similar trends and patterns in abundance over the past 40 years. The 1998 Chinook Status Review (Myers *et al.* 1998) reported that long-term trends in abundance for upper Columbia spring chinook populations were generally negative, ranging from -5% to +1%. Analyses of the data series, updated to include 1996-2001 returns, indicate that those trends have continued. The long-term trend in spawning escapement is downward for all three systems. The Wenatchee River spawning escapements have declined an average of 5.6% per year, the Entiat River population at an average of 4.8%, and the Methow River population an average rate of 6.3% per year since 1958. These rates of decline were calculated from the redd count data series.

The Upper Columbia spring chinook ESU was reviewed by the BRT in late 1998, which determined that average recent escapements to the ESU has been less than 5,000 hatchery plus wild chinook salmon, and individual populations all consist of less than 100 fish. The BRT was concerned that at these population sizes, negative effects of demographic and genetic stochastic processes are likely to occur. Furthermore, both long- and short-term trends in abundance are declining, many strongly so. The BRT recognized that habitat degradation, blockages and hydrosystem passage mortality all have contributed to the significant declines in this ESU.

Short-term return rates for the aggregate population areas reported in the 1998 Status Review (Myers *et al.* 1998) ranged from a -15.3% (Methow River) to a -37.4% (Wenatchee River). The Escapements from 1996-1999 reflected that downward trend. Escapements increased substantially in 2000 and 2001 in all three systems. Returns to the Methow River and the Wenatchee River reflected the higher return rate on natural production as well as a large increase in contributions from supplementation programs. Short-term trends (1990-2001) in natural returns remain negative for all three upper Columbia spring chinook populations. Natural returns to the spawning grounds for the Entiat, Methow, and Wenatchee River populations continued downward at average rates of 3%, 10%, and 16% respectively.

The Upper Columbia Biological Requirements Workgroup (Ford *et al.* 2001) recommended interim delisting levels of 3,750, 500, and 2,200 spawners for the populations returning to the Wenatchee, Entiat, and Methow drainages, respectively. The most recent five-year geometric mean spawning escapements (1997 to 2001) were at 8%-15% of these levels. Target levels have not been exceeded since 1985 for the Methow run and the early 1970s for the Wenatchee and Entiat populations.

Previous assessments of stocks within this ESU have identified several as being at risk or of concern. WDF et al. (1993) considered nine stocks within this ESU, of which eight were considered to be of native origin and predominately natural production. The status of all nine stocks was considered as depressed. Nehlsen *et al.* (1991) listed six additional stocks from the upper Columbia as extinct. All of those stocks were associated with drainages entering the Columbia River mainstem above Chief Joseph and Grand Coulee Dams. Those projects blocked off access by adult anadromous fish to the upper basin.

Upper Willamette River Chinook

No formal trend analyses have been conducted on any of the Upper Willamette chinook populations. However, dam counts, spawning ground surveys and carcass recovery indicate that populations in the Molalla and Calapooia Rivers are believed to be extirpated, or nearly so. Populations in the North and South Santiam Rivers, and the Middle Fork of the Willamette are not considered to be self sustaining. Populations in the Clackamas and McKenzie Rivers have shown substantial increases in total abundance (mixed hatchery- and natural-origin) in the last couple of years. The spring chinook population above Leaburg Dam in the McKenzie is considered the best in the ESU, but with over 20% of the fish of hatchery-origin, it is difficult to determine if this population would be naturally self-sustaining. The population has shown substantial increases in total abundance (mixed hatchery- and natural-origin) in the last couple of years.

Lower Columbia River Chinook

The abundances of natural-origin spawners range from completely extirpated for most of the spring run populations to over 6,500 for the Lewis River bright population. The majority of the fall run tule populations have a substantial fraction of hatchery-origin spawners in the spawning areas and are hypothesized to be sustained largely by hatchery production. Exceptions are the Coweeman and the Sandy fall run populations which have few hatchery fish spawning on the natural spawning areas. These populations have recent mean abundance estimates of 348 and 183 spawners respectively. The majority of the spring run populations have been extirpated largely as the result of dams blocking access to their high elevation habitat. The two bright chinook populations (*i.e.* Lewis and Sandy) have relatively high abundances, particularly the Lewis.

The majority of populations have a long-term trend less than one, indicating the population is in decline. The potential reasons for these declines include habitat degradation, deleterious hatchery practices, and climate-driven changes in marine survival.

The Lewis River bright population is considered the healthiest in the ESU. The population is significantly larger than any other population in the ESU. The Lewis bright chinook harvest has been managed to an escapement target of 5,700 and this target has been met every year for which data are available. Indicators suggest a relatively healthy population. However, the long-term population trend estimate is negative, and it is not clear the extent to which this reflects management decisions to harvest closer to the escapement goal as compared to declining productivity over the time series. The population is also geographically confined to a reach that is only a few kilometers in length and is immediately below Merwin Dam, where it is affected by the flow management of the hydrosystem. This limited spatial distribution is a potential risk factor

Puget Sound Chinook

The BRT concluded in 1999 that the Puget Sound chinook ESU was likely to become endangered in the foreseeable future. The estimated total run size of chinook salmon to Puget Sound in the early 1990s was 240,000 chinook, down from an estimated 690,000 historic run size. During the period from 1992-1996 the five-year geometric mean of spawning escapement of natural chinook salmon runs in North Puget Sound (13,000), Hood Canal (1,100), and the Elwha (105), and Dungeness (1,800) Rivers all exhibited negative long- and short-term trends. In south Puget Sound, spawning escapement of the natural runs averaged 11,000 spawners at the time of the last status review update. In this area, both long- and short-term trends were predominantly positive.

The most recent five-year geometric mean (natural spawner numbers in populations of Puget Sound chinook ranges from 42 (in the Dosewallips) to just over 7,000 fish (in the upper Skagit population). Most populations contain natural spawners numbering in the hundreds (median recent natural escapement = 481); and of the six populations with greater than 1,000 natural spawners, only two are thought to have a low fraction of hatchery fish. Estimates of historical equilibrium abundance from predicted pre-European settlement habitat conditions range from 1,700 to 51,000 potential chinook spawners per population. The historical estimates of spawner capacity are several orders of magnitude higher than realized spawner abundances currently observed throughout the ESU.

Long-term trends in abundance and median population growth rates for naturally-spawning populations of chinook in Puget Sound both indicate that approximately half of the populations are declining and half are increasing in abundance over the length of available time series, and most populations are just replacing themselves (NMFS 2003a). The most extreme declines in natural spawning abundance have occurred in the North Fork Nooksack, North Fork Stillaguamish, Green, and Elwha populations over the long term. All of those populations likely have a moderate to high fraction of naturally-spawning hatchery fish. Those populations with the greatest long-term population growth rates are the Upper Cascade, White, Puyallup, and Dosewallips; all of which likely have a high fraction of naturally-spawning, hatchery fish except for the Upper Cascade.

Snake River Fall Chinook

Previous status reviews identified a steady and severe decline in abundance since the early 1970s, loss of primary spawning and rearing areas upstream from Hells Canyon Dam complex, increased non-local hatchery contribution to adult escapement over Lower Granite Dam, and relatively high harvest impacts (Section A.2.1). There has been an upward trend in returns over Lower Granite Dam since the mid 1990s. Returns classified as natural-origin exceeded 2,600 fish in 2001, compared to a 1997-2001 geometric mean natural-origin count of 871. Both the long and short-term trends in natural returns are positive. Harvest impacts on Snake River fall chinook declined after listing and have remained relatively constant in recent years. There have been major reductions in fisheries impacting this stock. Mainstem conditions for subyearling chinook migrants from the Snake River have generally improved since the early 1990s. The outside (outside the Snake River) hatchery component has decreased as a percentage of the run at Lower Granite Dam from the 1998/99 status reviews (five-year average of 26.2%) to 2001 (8%). This reflects an increase in the Lyons Ferry component, systematic removal of marked hatchery fish at the Lower Granite trap, and modifications to the Umatilla supplementation program to increase homing of fall chinook release groups.

Snake River Spring/Summer Chinook

A previous BRT conclusion was that the ESU escapement had dropped to a small fraction of historical levels. Causes were mainstem hydropower development including altered flow regimes, impacts on estuarine habitats, regional habitat degradation, and risks associated with use of outside hatchery stocks (Section A.2.2). Returns of spring chinook measured at Lower Granite Dam showed a large increase over recent year abundances. However, 98.4% of the 2001 run was estimated to be of hatchery-origin. The 1997 to 2001 geometric mean total return for the summer run component at Lower Granite was slightly more than 6,000, compared to the geometric mean of 3,076 for the years 1987 to 1996. Long-term trend and lambda estimates were below 1 for all natural production data sets. Short-term trends and lambda estimates were generally positive with relatively large confidence intervals. Tucannon River, Poverty Flat and Sulfur Creek index areas had the lowest short-term lambda estimates in the series. Harvest impacts are now generally low. Increased escapement led to an increase in harvest beginning in 2000. Tributary habitat conditions vary widely among the various drainages of the Snake River. There is habitat degradation in many areas of the basin, reflecting impacts of forest, grazing, and mining practices. Spring and summer chinook are produced at a number of artificial production facilities, with releases from outside basin stocks currently a small fraction of the total release in the basin.

2.1.1.2 Coho Salmon

<u>Biological Requirements and Life History</u>
The status of coho salmon from Washington, Oregon and California was reviewed by Weitkamp *et al*. 1995 and updated by NMFS (2003a). This information is summarized below, and information sources cited in those documents are included here by reference.

In contrast to the life history patterns of other Pacific salmonids, coho salmon generally exhibit a relatively simple three-year life cycle. Most coho salmon enter rivers between September and February. Coho salmon river entry timing is influenced by many factors, one of which appears to be river flow. In addition, many small California stream systems have their mouths blocked by sandbars for most of the year except winter. In these systems, coho salmon and other Pacific salmonid species are unable to enter the rivers until sufficiently strong freshets open passages through the bars. Coho salmon spawn from November to January, and occasionally into February and March.

Although each native stock appears to have a unique time and temperature for spawning that theoretically maximizes offspring survival, coho salmon generally spawn at water temperatures within the range of 10-12.8°C. Spawning occurs in a few third-order streams, but most spawning activity was found in fourth- and fifth-order streams. Spawning occurs in tributary streams with a gradient of 3% or less. Spawning occurs in clean gravel ranging in size from that of a pea to that of an orange, and is concentrated in riffles or in gravel deposits at the downstream end of pools featuring suitable water depth and velocity.

The favorable range for coho salmon egg incubation is 10-12.8°C. Eggs incubate for approximately 35 to 50 days, and start emerging from the gravel two to three weeks after hatching. Following emergence, fry move into shallow areas near the stream banks. As fry grow, they disperse upstream and downstream to establish and defend territories.

Juvenile rearing usually occurs in tributary streams with a gradient of 3% or less, although they may move up to streams of 4% or 5% gradient. Juveniles have been found in streams as small as one to two meters wide. At a length of 38-45 mm, the fry may migrate upstream a considerable distance to reach lakes or other rearing areas. Rearing requires temperatures of 20°C or less, preferably 11.7-14.4°C. Coho salmon fry are most abundant in backwater pools during spring. During the summer, fry prefer pools featuring adequate cover such as large woody debris, undercut banks, and overhanging vegetation. Juvenile coho salmon prefer to over-winter in large mainstem pools, backwater areas and secondary pools with large woody debris, and undercut bank areas. Coho salmon rear in fresh water for up to 15 months, then migrate to the sea as smolts between March and June.

The ideal food channel for maximum coho smolt production would have shallow depth (7-60 cm), fairly swift mid-stream flows (60 cm/sec), numerous marginal back-eddies, narrow width (3-6 cm), copious overhanging mixed vegetation (to lower water temperatures, provide leaf-fall, and contribute terrestrial insects), and banks permitting hiding places. The early diets of emerging fry include chironomid larvae and pupae. Juvenile coho salmon are carnivorous opportunists that primarily eat aquatic and terrestrial insects. They do not appear to pick stationary items off the substratum.

Little is known about residence time or habitat use in estuaries during seaward migration, although it is usually assumed that coho salmon spend only a short time in the estuary before entering the ocean. Growth is very rapid once the smolts reach the estuary. While living in the ocean, coho salmon remain closer to their river of origin than do chinook salmon. Nevertheless, coho salmon have been captured several hundred to several thousand kilometers away from their natal stream (Hassler 1987). After about 12 months at sea, coho salmon gradually migrate south and along the coast, but some appear to follow a counter-clockwise circuit in the Gulf of Alaska (Sandercock 1991). Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as three year-olds. Some precocious males, called "jacks," return to spawn after only six months at sea.

Status and Population Trends

The status of coho salmon from Washington, Oregon and California was reviewed by Weitkamp *et al*. (1995) and updated by NMFS (2003a). This information is summarized below by ESU.

Puget Sound/Strait of Georgia Coho

Coho salmon within this ESU are abundant and, with some exceptions, run sizes and natural spawning escapements have been generally stable. However, artificial propagation of coho salmon appears to have had a substantial impact on native, natural coho salmon populations, to the point that it is difficult to identify self-sustaining, native stocks within this region. In addition, continuing loss of habitat, extremely high harvest rates, and a severe recent decline in average size of spawners indicate that there are substantial risks to whatever native production remains. There is concern that if present trends continue, this ESU is likely to become endangered in the foreseeable future. However, the size data examined are heavily influenced by fishery data from the Puget Sound. These fisheries target primarily hatchery stocks, and it is not known at this time to what extent the trends in size are influenced by hatchery fish. The extent of hatchery contribution to the natural spawning escapement and to natural production is unclear, as are the potential effects this contribution may have on the population genetics and ecology of this ESU. Further consideration of this ESU is warranted to attempt to clarify some of these uncertainties.

Lower Columbia River/Southwest Washington Coho

The vast majority (over 90%) of the historic populations in the LCR coho salmon ESU appear to be either extirpated or nearly so. The two populations with any significant production (Sandy and Clackamas) are at appreciable risk because of low abundance, declining trends and failure to respond after a dramatic reduction in harvest. Some populations are above impassible barriers and are completely extirpated. Most of the other populations, except for the Clackamas and Sandy are believed to have very little, if any, natural production.

The Clackamas population had a recent mean abundance of 1,126 and a relatively low recent fraction of hatchery-origin spawners at 6%. The long-term trends and growth rate estimates for the Clackamas over the period 1957-2001 have been slightly positive and the short-term trends a have been slightly negative. However, both the long-term and short-term trends have relatively high probabilities of being less than one.

Despite upturns in the last two years, the population has had more years below replacement since 1990 than above. Thus, even with the dramatic reductions in harvest rate, the population failed to respond because of this recruitment failure. Although the recent increases in recruitment are encouraging, the population has not regained earlier levels and it is unknown if they will persist. The recent increases in recruitment are attributed to increased marine survival, which we cannot predict with any certainty.

The Sandy population had a recent mean abundance of 342 spawners and a very low fraction of hatchery-origin spawners. Trends in the Sandy are similar to the Clackamas. The long-term trends and growth rate estimates over the period 1977-2001 have been slightly positive and the short-term trends have been slightly negative. However, both the long-term and short-term trends have relatively high probabilities of being less than one.

Other Oregon populations of the Columbia coho ESU are dominated by hatchery production. There is very little (and in some years practically no) natural production in Oregon outside the Clackamas and Sandy. The Washington side of this ESU is also dominated by hatchery production and there are no populations with appreciable natural production.

Central California Coast Coho Salmon

Data is sparse for historic abundance in the ESU, but abundance is estimated to be considerably lower than historic levels, with some local extirpations. Risk factors identified by the previous BRT included low abundance compared to historic levels, widespread local extinctions, clear downward trends in abundance and extensive habitat degradation. The main stocks in the ESU have been heavily influenced by hatcheries, with many out-of-ESU transfers. In 2002 it was estimated that coho salmon remain in 42% of streams they historically used in the ESU. There is no time series spanning eight or more years for adult abundance free from hatchery influence in the ESU. Artificial propagation has been reduced since the ESU was listed in 1996 and harvest has been reduced. A number of populations in the southern portion of the range appear either extinct or nearly so. The BRT estimates this to be the case in the southern two-thirds of the ESU, including several major river basins.

Oregon Coast Coho

The total average (five-year geometric mean) spawner abundance for this ESU in 1996 was estimated at about 52,000. Corresponding ocean run size for the same year was estimated to be about 72,000; this corresponds to less than one-tenth of ocean run sizes estimated in the late 1800s and early 1900s, and only about one-third of those in the 1950s. Total freshwater habitat production capacity for this ESU was estimated to correspond to ocean run sizes between 141,000 under poor ocean conditions and 924,000 under good ocean conditions. Abundance was unevenly distributed within the ESU at this time, with the largest total escapement in the relatively small Mid/South Coast region, and lower numbers in the North/Mid Coast and Umpqua regions.

Trend estimates using data through 1996 showed that for all three measures (escapement, run size, and recruits-per-spawner), long-term trend estimates were negative. More recent escapement trend estimates were positive for the Umpqua and Mid/South Coast Monitoring Areas, but negative in the North/Mid Coast. Recent trend estimates for recruitment and recruits-per-spawner were negative in all three areas, and exceed 12% annual decline in the two northern areas. Six years of stratified random survey population estimates showed an increase in escapement and decrease in recruitment.

In 1997, the BRT concluded that, assuming that 1997 conditions continued into the future (and that proposed harvest and hatchery reforms were not implemented), this ESU was not at significant short-term risk of extinction, but that it was likely to become endangered in the foreseeable future. Total recent average (five-year geometric mean) spawner abundance for this ESU is estimated at about 55,000, up from 52,000 in the 1997 update and also slightly higher than the estimate at the time of the status review. Corresponding ocean run size is estimated to be about 178,000; this corresponds to one-tenth of ocean run sizes estimated in the late 1800s and early 1900s, and only about one-third of those in the 1950s. Present abundance is more evenly distributed within the ESU than it was in 1997. The largest total escapement remains in the relatively small Mid/South Coast MA and has almost doubled since 1996, but the North and Mid-North Coast MAs have increased 10-fold by 2001. The Umpqua MA is up by a factor of 4.

Twelve-year trends of spawner abundance have been positive in 10 of the 11 basins, with the biggest increases (> 10% per year) on the North Coast (Necanicum, Nehalem, Nestucca), Mid-coast (Yaquina) and the Umpqua, and with smaller increases on the Central (Siletz, Siuslaw) and South (Coos, Coquille) coast. The Alsea was the only system to show a decrease in spawners. Twelve-year trends in pre-harvest recruits show a less favorable picture. Necanicum, Nehalem, Nestucca and Umpqua all showed positive trends of about 5% per year. The Yaquina had a slightly positive trend of about 1% per year. The remaining six basins showed declines ranging up to 10% per year in the Alsea. The most recent five-year geometric mean abundance showed little relationship to trend. Twelve-year trends for the ESU as a whole showed an increase in spawners of 8% per year and a decline in recruits of 1% per year.

Long-term (32-year) trends in spawner abundance for both the lakes and rivers have been relatively flat, with lakes declining about 2% per year and rivers increasing about 1% per year. Lakes and rivers trends in recruits have been negative, with both lakes declining about 6% per year.

With extremely low escapements in recent years many small systems have shown local extirpations. These systems are apt to be repopulated by stray spawners if abundances increase. Whether these events represent loss of genetic diversity is not known.

Southern Oregon/Northern California Coast Coho

Gold Ray Dam (Rogue River) adult coho passage counts during the 1940s averaged about 2,000 adult coho salmon per year. Between the late 1960s and early 1970s, adult counts averaged fewer than 200. During the late 1970s, dam counts increased, corresponding with returning coho salmon produced at Cole Rivers Hatchery. Coho salmon run size estimates derived from seine surveys at Huntley Park near the mouth of the Rogue River have ranged from about 450 to 19,200 naturally-produced adults between 1979 and 1991. In Oregon south of Cape Blanco, Nehlsen *et al*. (1991) considered all but one coho salmon population to be at high risk of extinction. South of Cape Blanco, Nickelson *et al*. (1992) rated all Oregon coho salmon populations as depressed.

Naturally-spawned adult coho salmon returning to California streams were estimated to be at less than 1% of their abundance at mid-century, and indigenous, wild coho salmon populations in California did not exceed 100 to 1,300 individuals. Further, 46% of California streams which historically supported coho salmon populations, and for which recent data are available, no longer supported runs.

California Department of Fish and Game (1994) concluded that "coho salmon in California, including hatchery populations, could be less than 6% of their abundance during the 1940's, and have experienced at least a 70% decline in the 1960's." Further, they reported that coho salmon populations have been virtually eliminated in many streams, and that adults are observed only every third year in some streams, suggesting that two of three brood cycles may already have been eliminated.

The rivers and tributaries in the California portion of this ESU were estimated to have average recent runs of 7,080 natural spawners and 17,156 hatchery returns, with 4,480 identified as "native" fish occurring in tributaries having little history of supplementation with non-native fish. Combining recent run-size estimates for the California portion of this ESU with Rogue River estimates provides a rough minimum run-size estimate for the entire ESU of about 10,000 natural fish and 20,000 hatchery fish.

More recent data (Schiewe,1997a) indicates that the proportion of streams with coho salmon present is lower than in the earlier study (52% vs. 63%). New data on presence/absence in northern California streams that historically supported coho salmon are even more disturbing than earlier results, indicating that a smaller percentage of streams in this ESU contain coho salmon compared to the percentage presence earlier. However, it is unclear whether these new data represent actual trends in local extinctions, or are biased by sampling effort.

In the California portion of the SONCC coho salmon ESU, there appears to be a general decline in abundance. In the California portion of the ESU, Trinity River Hatchery maintains large production and is thought to create significant straying to natural populations. In the California portion of the ESU, the percent of streams with coho present in at least one brood year has shown a decline from 1989 to 1991 to the present. In 1989 to 1991, and 1992 to 1995, coho were found in over 80% of the streams surveyed. Since then, the percentage has declined to 69% in the most recent three-year interval.

Both the presence-absence and trend data suggest that many coho salmon populations in this ESU continue to decline. Presence-absence information from the past 12 years indicates fish have been extirpated or at least reduced in numbers sufficiently to reduce the probability of detection in conventional surveys.

2.1.1.3 Chum Salmon

Biological Requirements and Life History

The status of chum salmon from Washington, Oregon and California was reviewed by Johnson *et al* (1997) and updated by NMFS (2003a). This information is summarized below, and information sources cited in those documents are included here by reference.

Chum salmon (*Oncorhynchus keta*) are semelparous, spawn primarily in freshwater, and apparently exhibit obligatory anadromy, as there are no recorded landlocked or naturalized freshwater populations. Chum salmon have been documented to spawn from Korea and the Japanese island of Honshu, east, around the rim of the North Pacific Ocean, to Monterey Bay in California. Presently, major spawning populations are found only as far south as Tillamook Bay on the Northern Oregon coast. The species' range in the Arctic Ocean extends from the Laptev

Sea in Russia to the Mackenzie River in Canada. Chum salmon may historically have been the most abundant of all salmonids. Prior to the 1940s, chum salmon may have contributed almost 50% of the total biomass of all salmonids in the Pacific Ocean.

Chum salmon spend more of their life history in marine waters than other Pacific salmonids. Like pink salmon, chum salmon usually spawn in coastal areas, and juveniles out migrate to seawater almost immediately after emerging from the gravel that covers their redds. This ocean-type migratory behavior contrasts with the stream-type behavior of some other species in the genus *Oncorhynchus* (*e.g.*, coastal cutthroat trout, steelhead, coho salmon, and most types of chinook and sockeye salmon), which usually migrate to sea at a larger size, after months or years of freshwater rearing. This means survival and growth in juvenile chum salmon depends less on freshwater conditions than on favorable estuarine conditions. Another behavioral difference between chum salmon and species that rear extensively in freshwater is that chum salmon form schools, presumably to reduce predation.

Status and Population Trends

The status of chum salmon from Washington, Oregon and California was reviewed by Johnson *et al* (1997) and updated by NMFS (2003a). This information is summarized below by ESU.

Hood Canal Summer-run Chum

The BRT last reviewed the Hood Canal summer chum ESU status in November 1998 and cited concerns related to low current abundance relative to historical, extirpation of historical populations on the eastern part of Hood Canal, declining trends, and low productivity. Other concerns included the increasing urbanization of the Kitsap Peninsula, recent increases in pinniped populations in Hood Canal, and the fact that recent increases in spawning escapement have been associated primarily with hatchery supplementation programs.

In 1994, petitioners identified 12 streams in Hood Canal as recently supporting spawning populations of summer chum salmon. At the time of the petition, summer chum salmon runs in five of these streams may already have been extinct, and those in six of the remaining seven showed strong downward trends. Similarly, summer chum salmon in Discovery and Sequim Bays were also at low levels of abundance. Spawner surveys in 1995 and 1996 revealed substantial increases in the number of summer chum salmon returning to some streams in Hood Canal and the Strait of Juan de Fuca. However, serious concerns remained. First, the population increases in 1995 and 1996 were limited to streams on the western side of Hood Canal, especially the Quilcene River system, while streams on the southern and eastern sides continued to have few or no returning spawners. Second, a hatchery program initiated in 1992 was at least partially responsible for adult returns to the Quilcene River system. Third, the strong returns to the west-side streams were the result of a single, strong year class, while declines in most of these streams have been severe and have spanned two decades. Last, greatly reduced incidental harvest rates in recent years probably contributed to the increased abundance of summer chum salmon. Spawning escapement to the ESU in 1997 was estimated to be 10,013 fish and estimated in 1998 to be 5,290 fish. Of these totals, 8,734 spawners in 1997, and 3,959 spawners in 1998 returned to streams with supplementation programs.

Recent geometric mean abundance of summer chum in Hood Canal streams ranges from one to almost 4,500 spawners (median = 109, mean = 542) (Table E.2.1.2; Fig. E.2.1.1). Estimates for the fraction of hatchery fish in the combined Quilcene and Salmon/Snow populations are greater than 60%, indicating that the reintroduction program through hatchery supplementation is resulting in spawners in streams.

Long-term trends in abundance and median population growth rates for naturally-spawning populations of summer chum in Hood Canal both indicate that only two populations (combined Quilcene and Union River) are increasing in abundance over the length of available time series. The most extreme short-term declines in natural spawner abundance have occurred in the Jimmycomelately Creek and Lilliwaup populations. The populations with the most positive short-term trends and population growth rates are the Quilcene, Big Beef Creek, and Dosewallips populations.

Columbia River Chum

Chum salmon in the Columbia River once numbered in the hundreds of thousands of adults and, at times, approached a million. The total number of chum salmon returning to the Columbia in the last 50 years has averaged perhaps a few thousand, returning to a very restricted subset of the historical range. Significant spawning occurs in only two of the 16 historical populations, meaning that 88% of the historical populations are extirpated, or nearly so. The two extant populations are at Grays River and the Lower Gorge.

The majority of chum spawning in the Grays River currently occurs in less than 1 mile of the river. Prior to its destruction in a 1998 flood, an artificial spawning channel created by WDFW in 1986, was the location of approximately 50% of the spawning in the Grays River population. Population growth estimates for the Grays River population shows negative long- and short-term trends (1950 to 2000). Preliminary abundance estimates for 2002 suggest a substantial increase in abundance in 2002 over what has been observed over the last 50 years, with the total population size being in the neighborhood of 10,000 adults. In 1999, 120,000 hatchery chum were released into the Grays River and 60,000 hatchery chum were released into the Chinook River. These fish returned as 3 year olds in 2002 and are included in the 10,000 adult estimate. However, researchers believe that the large increase in the Grays River is not simply the result of the hatchery program.

The Lower Gorge population consists of a number of subpopulations immediately below Bonneville dam. The subpopulations include Hardy Creek, Hamilton Creek, Ives Island, and the Multnomah area. Both the Ives Island and Multnomah area sub-populations spawn in the Columbia mainstem. This population has shown a downward trend since the 1950s and has been at a relatively low abundance of up to 2000. However, preliminary data indicate that the 2002 abundance has shown a substantial increase estimated at greater than 2,000 chum in the

Hamilton and Hardy creeks, plus another 8,000 or more in the mainstem. There have been no hatchery releases in the lower gorge population, so hatcheries are not responsible for this increase in 2002.

A group of chum were recently observed (within the last three to four years) to be spawning in the mainstem Columbia on the Washington side, just upstream of the I-205 bridge. In 2000, WDFW estimated 354 spawners at this location. As with the two other Columbia chum spawning populations, preliminary data indicate a dramatic increase in 2002. Preliminary estimates put the abundance of this population in the range of several thousand spawners.

A large portion of the Upper Gorge population chum habitat is believed to have been inundated by Bonneville Dam. However, small numbers of chum still pass Bonneville Dam. The number of fish passing Bonneville showed some increase in 2002, but not the dramatic increases estimated in the other three populations.

In 2000, WDFW conducted a study to determine the distribution and abundance of chum on the Washington side of the Columbia River. Very small numbers of chum were observed in several locations, but with the possible exception of the I-205 population, none of the populations would be considered close to self-sustaining abundances.

Chum spawn on the Oregon side of the lower gorge population (Multnomah area), but appear to be essentially absent from other populations in the Oregon portion of this ESU. In 2000, ODFW conducted surveys with a similar purpose to the WDFW 2000 surveys (*i.e.* to determine the abundance and distribution of chum in the Columbia). Out of 30 sites surveyed, only one chum was observed. With the exception of the Lower Gorge population, Columbia chum are considered extirpated, or nearly so, in Oregon.

Based on the updated information provided in its report, NMFS (2003a) estimated that at least 88% of the historical Colombia River chum salmon populations are extirpated, or nearly so. The extant populations have been at low abundance for the last 50 years in the range where stochastic processes could lead to extinction. Encouragingly, there has been a substantial increase in the abundance of these two populations and the new (or newly discovered) I-205 population. However, it is not known if this increase will continue and the abundance is still substantially below the historical levels.

2.1.1.4 Steelhead

<u>Biological Requirements and Life History</u>

The status of steelhead from Washington, Oregon and California was reviewed by Busby *et al.* (1996) and updated by NMFS (2003a). This information is summarized below, and information sources cited in those documents are included here by reference.

Biologically, steelhead can be divided into two basic run-types, based on the state of sexual maturity at the time of river entry and duration of spawning migration. The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry. Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, while others only have one run-type. South of Cape Blanco, Oregon, summer steelhead are known to occur in the Rogue, Smith, Klamath, Trinity, Mad, and Eel rivers, and in Redwood Creek.

Summer steelhead enter fresh water between May and October in the Pacific Northwest. They require cool, deep holding pools during summer and fall, prior to spawning. They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration in early spring to natal streams, and then spawn in January and February.

Winter steelhead enter fresh water between November and April in the Pacific Northwest, migrate to spawning areas, and then spawn, generally in April and May. Some adults, however, do not enter some coastal streams until spring, just before spawning.

There is a high degree of overlap in spawn timing between populations within an ESU regardless of run type. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying; most that do so are females. Iteroparity is more common among southern steelhead populations than northern populations.

Steelhead spawn in cool, clear streams featuring suitable gravel size, depth, and current velocity. Intermittent streams may be used for spawning. Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn and are vulnerable to disturbance and predation. Cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity are required to reduce disturbance and predation of spawning steelhead. It appears that summer steelhead occur where habitat is not fully utilized by winter steelhead; summer steelhead usually spawn further upstream than winter steelhead.

Steelhead require a minimum depth of 0.18 m and a maximum velocity of 2.44 m/s for active upstream migration. Spawning and initial rearing of juvenile steelhead generally take place in small, moderate-gradient (generally 3-5%) tributary streams (Nickelson *et al*. 1992). A minimum depth of 0.18 m, water velocity of 0.30-0.91 m/s (Smith 1973; Thompson 1972), and clean substrate 0.6-10.2 cm are required for spawning. Steelhead spawn in 3.9-9.4°C water.

Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months before hatching, generally between February and June. Steelhead eggs incubate about 85 days at 4°C and 26 days at 12°C to reach 50% hatch. Eggs hatch in 35-50 days, depending upon water temperature.

After two to three weeks, in late spring, and following yolk sac absorption, alevins emerge from the gravel and begin actively feeding. After emerging from the gravel, fry usually inhabit shallow water along banks of perennial streams. Fry occupy stream margins. Older fry establish and defend territories.

Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers.

Juvenile steelhead migrate little during their first summer and occupy a range of habitats featuring moderate to high water velocity and variable depths. Rearing juveniles prefer water temperatures ranging from 12-15°C. Juvenile steelhead feed on a wide variety of aquatic and terrestrial insects, and older juveniles sometimes prey on emerging fry. Steelhead hold territories close to the substratum where flows are lower and sometimes counter to the main stream; from these, they can make forays up into surface currents to take drifting food. Juveniles rear in freshwater from one to four years (usually two years in the California ESUs), then smolt and migrate to the ocean in March and April. Winter steelhead populations generally smolt after two years in fresh water). Steelhead smolts are usually 15-20 cm total length and migrate to the ocean in the spring. Based on purse seine catch, juvenile steelhead tend to migrate directly offshore during their first summer from whatever point they enter the ocean rather than migrating along the coastal belt as salmon do. During the fall and winter, juveniles move southward and eastward.

Steelhead typically reside in marine waters for two or three years prior to returning to their natal stream to spawn as four- or five-year-olds (August 9, 1996, 61 FR 41542). Populations in Oregon and California have higher frequencies of age-1 ocean steelhead than populations to the north, but age-2 ocean steelhead generally remain dominant. Age structure appears to be similar to other west coast steelhead, dominated by four-year-old spawners. Some steelhead return to fresh water after only two to four months in the ocean and are termed "half-pounders". Half-pounders generally spend the winter in fresh water and then out migrate again the following spring for several months before returning to fresh water to spawn. Half-pounders occur over a relatively small geographic range in southern Oregon and northern California, and are only reported in the Rogue, Klamath, Mad, and Eel rivers.

<u>Status and Population Trends</u>

Information from Busby *et al.* (1996) and updated by NMFS (2003a) regarding the status of steelhead from Washington, Oregon and California is summarized below by ESU.

Upper Columbia River Steelhead

The 1998 steelhead status review noted that although the total abundance of populations within this ESU has been relatively stable or increasing, it appears to be occurring only because of major hatchery supplementation programs. Estimates of the proportion of hatchery fish in spawning escapement were 65% (Wenatchee River) and 81% (Methow and Okanogan Rivers). The major concerns for this ESU were the clear failure of natural stocks to replace themselves, the problems of genetic homogenization, the apparent high harvest rates on steelhead smolts in rainbow trout fisheries and the degradation of freshwater habitats within the region.

Returns of both hatchery and naturally-produced steelhead to the upper Columbia have increased in recent years. Priest Rapids Dam is below upper Columbia steelhead production areas. The average 1997 to 2001 return counted through the Priest Rapids fish ladder was approximately 12,900 steelhead. The average for the previous five years (1992 to 1996) was 7,800 fish. However, total returns to the upper Columbia continue to be predominately hatchery-origin fish. The percentage of the run over Priest Rapids of natural-origin increased to over 25% in the 1980s, then dropped to less than 10% by the mid-1990s. The median percent wild for 1997 to 2001 was 17%.

Abundance estimates of returning naturally-produced upper Columbia steelhead have been based on extrapolations from mainstem dam counts and associated sampling information (*e.g.* hatchery/wild fraction, age composition). The natural component of the annual steelhead run over Priest Rapids increased from an average of 1,040 (1992 to 1996) to 2,200 (1997 to 2001). The estimate of the combined natural steelhead return to the Wenatchee and Entiat Rivers increased to a geometric mean of approximately 900 for the 1996 to 2001 period. The average percentage natural dropped from 35% to 29% for the recent five-year period. In terms of natural production, recent production levels remain well below the interim recovery levels developed for these populations.

The Methow steelhead population is the primary natural production area above Wells Dam. The 1997 to 2001 geometric mean of natural returns over Wells Dam was 358, lower than the geometric mean return prior to the 1998 status review. The most recent return reported in the data series, 1,380 naturally-produced steelhead in 2001, was the highest single annual return in the 25-year data series. Hatchery returns continue to dominate the run over Wells Dam. The average percent of wild origin dropped to 9% for 1996 to 2001 compared to 19% for the period prior to the previous status review. Natural returns have increased in recent years for both stock groupings.

Both short-term and long-term growth rate estimates are positive under the assumption that hatchery fish have not contributed to natural production in recent years. Estimates under the assumption that hatchery fish contributed at the same level as wild fish to natural production are substantially lower—under this scenario natural production is consistently and substantially below the total number (hatchery- plus natural-origin) of spawners in any given year.

Under the assumption that hatchery and wild spawners are both contributing to the subsequent generation of natural returns, return-per-spawner levels have been consistently below 1.0 since 1976. Under this scenario natural production would be expected to decline rapidly in the absence of hatchery spawners. Under the assumption that hatchery fish returning to the upper

Columbia do not contribute to natural production, return-per-spawner levels were above one until the late 1980s. Return-per-spawner estimates subsequently dropped below replacement (1.0) and remained low until the most recent brood year with measured returns, 1996.

Lower Columbia River Steelhead

The 1998 steelhead status review noted that this ESU is characterized by: populations at low abundance relative to historical levels; significant population declines since mid-1980s; and widespread occurrence of hatchery fish in naturally-spawning steelhead populations. The review also was unable to identify any natural populations of steelhead in this ESU that would be considered at low risk. The analysis also suggested that introduced summer steelhead may negatively affect native winter steelhead in some populations

Recent abundance estimates of natural-origin spawners range from completely extirpated for some populations above impassable barriers to over 700 for the Kalama and Sandy winter-run populations. A number of the populations have a substantial fraction of hatchery-origin spawners in the spawning areas and are hypothesized to be sustained largely by hatchery production. Exceptions are the Kalama, the Toutle, and East Fork Lewis winter-run populations, which have few hatchery fish spawning on the natural spawning areas. These populations have relatively low recent mean abundance estimates, with the largest being the Kalama (geometric mean of 728 spawners).

The majority of populations have a long-term trend less than one, indicating the population is in decline. In addition, there is a high probability for most populations that the true trend/growth rate is less than one. When growth rate is estimated, assuming that hatchery-origin spawners have a reproductive success equal to that of natural-origin spawners, all of the populations have a negative growth rate except the North Fork Toutle winter run, which had very few hatchery-origin spawners. The North Fork Toutle population is recovering from the eruption of Mt. St. Helens in 1980 and is still at low abundance (recent mean of 196 spawners). The potential reasons for these declines have been cataloged in previous status reviews and include habitat degradation, deleterious hatchery practices, and climate-driven changes in marine survival.

NMFS (2003a) could not conclusively identify a single population that is naturally self-sustaining. Over the period of the available time series, most of the populations are in decline and are at relatively low abundance (no population has recent mean greater than 750 spawners). In addition, many of the populations continue to have a substantial fraction of hatchery-origin spawners and may not be naturally self-sustaining.

Oregon Coast Steelhead

Previous assessments within this ESU have identified several stocks as being at risk or of special concern. Nehlsen *et al.* (1991) identified 12 stocks as extinct, at risk, or of special concern. Most of the stocks of special concern were classified as such due to hatchery practices. ODFW considered 21 stocks within the ESU, of which 3, North Umpqua River summer and winter steelhead and Coquille River winter steelhead, were identified as healthy, 17 as depressed, and 1 (Necanicum River) of special concern.

Recent 5-year average total (natural and hatchery) run sizes for streams with adequate data range from 250 to 15,000, corresponding to escapements from 200 to12,000. Total recent (5-year average) run size for major streams in this ESU was approximately 129,000 (111,000 winter, 18,000 summer), with a total escapement of 96,000 (82,000 winter, 14,000 summer). These totals do not include all streams in the ESU, so they underestimate total ESU run size and escapements.

Adequate adult escapement information was available to compute trends for 42 independent stocks within this ESU. Of these, 36 stocks exhibited declines and 6 exhibited increases during the available data series. Trends ranged from a 12% annual decline in Drift Creek on the Siletz River to a 16% annual increase in North Fork Coquille River. Twenty of these trends were significantly different from zero with 18 decreasing and 2 increasing. Upward trends were found only in the southernmost portion of the ESU, from Siuslaw Bay south. In contrast, longer term trends in angler catch, using data from the early 1950s to the present, generally were increasing. This may reflect longer term stability of populations, or may be an artifact of long-term increases in statewide fishing effort coupled with the differences in bias correction of catch summaries before and after 1970.

Hatchery fish are widespread and escape to spawn naturally throughout the region. Most hatchery stocks used in this region originated from stocks indigenous to the ESU, but many are not native to local river basins. ODFW estimates of hatchery composition for recent winter steelhead escapements were high in many streams, ranging from 10% in the North Umpqua River to greater than 80% in Drift Creek on the Alsea River and in Tenmile Creek south of Umpqua Bay. For summer steelhead, hatchery composition (where reported) ranged from 38% in the South Umpqua River to 90% in the Siletz River. Several summer steelhead stocks have been introduced to rivers with no native summer runs.

Overall, approximately half of the stocks in this ESU for which we have information have hatchery composition in excess of 50%. Few stocks in the region are documented to have escapements above 1,000 fish and no significant decline. Most of those that do are in the southern portion of the ESU and have high hatchery influence. While there is little information on the actual contribution of hatchery fish to natural production, given the substantial presence of hatchery fish in the few stocks that are relatively abundant and stable or increasing, the BRT had substantial concern that the majority of natural steelhead populations in this ESU may not be self-sustaining.

Middle Columbia River Steelhead

The Middle Columbia River steelhead ESU includes steelhead populations in Oregon and Washington drainages upstream of the Hood and Wind River systems to, and including, the Yakima River. The Snake River is not included in this ESU. Major drainages in this ESU are the Deschutes, John Day, Umatilla, Walla-Walla, Yakima, and Klickitat river systems. Almost all steelhead populations within this ESU are summer-run fish, the exceptions being winter-run components returning to the Klickitat, and Fifteen Mile Creek watersheds. Most of the populations within this ESU are characterized by a balance between 1- and 2-year-old smolt outmigrants. Adults return after one or two years at sea. Hatchery facilities are located in a number of drainages within the geographic area of this ESU, although there are also subbasins with little or no direct hatchery influence. The John Day River system is a large river basin supporting an estimated five steelhead populations. The basin has not been outplanted with hatchery steelhead and out-of-basin straying is believed to be low. The Yakima River system includes four to five populations. Hatchery production in the basin was relatively limited historically and has been phased out since the early 1990s. The Umatilla, the Walla-Walla, and the Deschutes river systems each have ongoing hatchery production programs based on locally derived broodstocks. Straying from out-of-basin production programs into the Deschutes River has been identified as a chronic occurrence.

The 1998 and 1999 BRT reviews cited in NOAA Fisheries (2003a) identified several concerns including relatively low spawning levels in those streams for which information was available, a preponderance of negative trends (10 out of 14), and the widespread presence of hatchery fish throughout the ESU. The 1999 BRT review specifically identified "...the serious declines in abundance in the John Day River Basin…" as a point of concern given that the John Day system had supported large populations of naturally-spawning steelhead in the recent past. Concerns were also expressed about the low abundance of returns to the Yakima River system relative to historical levels "...with the majority of production coming from a single stream (Satus Creek)." The sharp decline in the returns to the Deschutes River system was also identified as a concern.

The previous BRT review identified a set of habitat problems affecting basins within this ESU. High summer and low winter temperatures are characteristic of production or migration reaches associated with populations within this ESU. Water withdrawals have seriously reduced flow levels in several Mid-Columbia drainages, including sections of the Yakima, Walla-Walla, Umatilla, and Deschutes rivers. Riparian vegetation and instream structure has been degraded in many areas—the previous BRT report states that "(O)f the stream segments inventoried within this ESU, riparian restoration is needed for between 37% and 84% of the river bank in various basins." With some exceptions, the recent five-year average (geometric mean) abundance for natural steelhead within this ESU was higher than levels reported in the last status review. Returns to the Yakima River, the Deschutes River, and to sections of the John Day River system were up substantially in comparison to 1992 to 1997. Yakima River returns are still substantially below interim target levels and estimated historical return levels. The recent five-year geometric mean return of the natural-origin component of the Deschutes River run has exceeded interim target levels. Recent five-year geometric mean annual returns to the John Day basin are generally below the corresponding mean returns reported in the previous status reviews. However, each of the major production areas in the John Day system has shown upward trends since the 1999 return year.

Recent year (1999 to 2001) redds-per-mile estimates of winter steelhead escapement in Fifteen Mile Creek were also up substantially relative to the annual levels in the early 1990s.

Returns to the Touchet River are lower that the previous five-year average. Trend or count information for the Klickitat River winter steelhead run are not available but current return levels are believed to be below interim target level.

Short-term trends in major production areas were positive for seven of the 12 areas. The median annual rate of change in abundance since 1990 was +2.5%. Individual trend estimates ranged from -7.9% to +11%. The same basic pattern was reflected in population growth estimates for the production areas. The median short-term (1990 to 2001) annual population growth rate estimate was 1.045, assuming that hatchery fish on the spawning grounds did not contribute to natural production, with eight of the 12 indicator trends having a positive growth rate. Assuming that potential hatchery spawners contributed at the same rate as natural-origin spawners resulted in lower estimates of population growth rates. The median short-term growth rate estimate under the assumption of equal hatchery/natural-origin spawner effectiveness was .967, with six of the 12 indicators exhibiting positive growth rates.

Long-term trend estimates were also calculated using the entire length of the data series available for each production area. The median estimate of long-term trend over the 12 indicator data sets was -2.1% per year (-6.9 to +2.9), with 11 of the 12 being negative. Long-term annual population growth rates were also negative. The median long-term estimate was .98 under the assumption that hatchery spawners do not contribute to production, and .97 under the assumption that both hatchery- and natural-origin spawners contribute equally.

All of the production area trends available for this ESU indicate relatively low escapement levels in the 1990s. For some of the data sets, earlier annual escapements were relatively high compared to the stream miles available for spawning and rearing. In those cases, it is reasonable to assume that subsequent production may have been influenced by density-dependent effects. In addition, there is evidence of large fluctuations in marine survival for Columbia River and Oregon coastal steelhead stocks (Cooney 2000, Chilcote 2001). Spawner return data sets for Mid-Columbia production areas are of relatively short duration. As a result of these considerations, projections based on simple population growth rate trends or on stock recruit relationships derived by fitting recent year spawner return data should be interpreted with caution

Upper Willamette River Steelhead

Two groups of winter steelhead currently exist in the upper Willamette. The "late-run" winter steel exhibit the historical phenotype adapted to passing the seasonal barrier at Willamette Falls. The falls were laddered and hatchery "early-run" winter steelhead fish were released above the falls. The early-run fish were derived from Columbia Basin steelhead outside the Willamette and are considered non-native. The release of winter-run hatchery steelhead has recently been discontinued in the Willamette, but some early-run winter steelhead are still returning from the earlier hatchery releases and from whatever natural production of the early-run fish that has been established. Non-native summer run hatchery steelhead are also released into the upper Willamette.

Evaluations of the status of individual populations in the Molalla, North Santiam, South Santiam, and Calapooia Rivers indicate declining population trends based upon time series or count data. It is questionable if there was ever a self-sustaining steelhead population in the west side. There is assumed to be little, if any, natural production of steelhead in west side tributaries.

Some of the uncertainty about this ESU exists, and there is no conclusive proof of a single population that is naturally self-sustaining. All populations are relatively small, with the recent mean abundance of the entire ESU at less than 6,000. Over the period of the available time series, most of the populations are in decline. The recent elimination of the winter-run hatchery production will allow estimation of the natural productivity of the populations in the future, but the available time series are confounded by the presence of hatchery-origin spawners. On a positive note, the counts all indicate an increase in abundance in 2001, likely at least partly as a result of improved marine conditions.

Northern California Steelhead

Prior to 1960, estimates of abundance specific to this ESU were available from dam counts in the upper Eel River (Cape Horn Dam–annual average of 4,400 adult steelhead in the 1930s), the South Fork Eel River (Benbow Dam – annual average of 19,000 adult steelhead in the 1940s), and the Mad River (Sweasey Dam – annual average of 3,800 adult steelhead in the 1940s).

In the mid-1960s, estimates of steelhead spawning populations for many rivers in this ESU totaled 198,000. The only current run-size estimates for this area are counts at Cape Horn Dam on the Eel River where an average of 115 total and 30 wild adults were reported.

Adequate adult escapement information was available to compute trends for seven stocks within this ESU. Of these, five data series exhibit declines and two exhibit increases during the available data series, with a range from 5.8% annual decline to 3.5% annual increase. Three of the declining trends were significantly different from zero. We have little information on the actual contribution of hatchery fish to natural spawning, and little information on present total run sizes for this ESU. However, given the preponderance of significant negative trends in the available data, there is concern that steelhead populations in this ESU may not be self-sustaining.

Updated spawner surveys of summer steelhead in Redwood Creek, the south for of the Van Duzen River (Eel River Basin), and the Mad River suggest mixed trends in abundance: the Van Duzen fish decreased by -7.1% from 1980 to 1996, and the Mad River summer steelhead have increased by 10.3% over the same time period . The contribution of hatchery fish to these trends in abundance is not known.

New weir counts of winter steelhead in Prairie Creek (Redwood Creek Basin, Humboldt county) show a dramatic increase (over 36%) in abundance during the period 1985 to 1992. This increase is difficult to interpret because a major highway construction project during this time period resulted in intensive monitoring of salmonids in the basin and Prairie Creek Hatchery was funded to mitigate lost salmonid production. Therefore, it is unclear whether the increase in steelhead reflects increased monitoring effort and mitigation efforts or an actual recovery of Prairie Creek steelhead.

Central California Coast Steelhead

Only two estimates of historical (pre-1960s) abundance specific to this ESU are available: an average of about 500 adults in Waddell Creek in the 1930s and early 1940s (Shapovalov and Taft 1954), and 20,000 steelhead in the San Lorenzo River before 1965 (Johnson 1964). In the mid-1960s, 94,000 steelhead adults were estimated to spawn in the rivers of this ESU, including 50,000 and 19,000 fish in the Russian and San Lorenzo rivers, respectively (California Department of Fish and Game 1965). Recent estimates indicate an abundance of about 7,000 fish in the Russian River (including hatchery steelhead) and about 500 fish in the San Lorenzo River. These estimates suggest that recent total abundance of steelhead in these two rivers is less than 15% of their abundance 30 years ago. Recent estimates for several other streams (Lagunitas Creek, Waddell Creek, Scott Creek, San Vincente Creek, Soquel Creek, and Aptos Creek) indicate individual run sizes of 500 fish or less. Steelhead in most tributaries to San Francisco and San Pablo bays have been virtually extirpated (McEwan and Jackson 1996). Fair to good runs of steelhead apparently still occur in coastal Marin County tributaries. In a 1994 to 1997 survey of 30 San Francisco Bay watersheds, steelhead occurred in small numbers at 41% of the sites, including the Guadalupe River, San Lorenzo Creek, Corte Madera Creek, and Walnut Creek (Leidy 1997).

Little information is available regarding the contribution of hatchery-produced fish to natural spawning of steelhead, and little information on present run sizes or trends for this ESU exists. However, given the substantial rates of declines for stocks where data do exist, the majority of natural production in this ESU is likely not self-sustaining (62 FR 43937).

Two significant habitat blockages are the Coyote and Warm Springs Dams in the Russian River watershed; data indicated that other smaller fish passage problems were widespread in the geographic range of the ESU. Other impacts noted in the status report were: urbanization and poor land-use practices; catastrophic flooding in 1964 causing habitat degradation; and dewatering due to irrigation and diversion. Principal hatchery production in the region comes from the Warm Springs Hatchery on the Russian River, and the Monterey Bay Salmon and Trout Project on a tributary of Scott Creek. At the time of the status review there were other small private programs producing steelhead in the range of the ESU, reported to be using stocks indigenous to the ESU, but not necessarily to the particular basin in which the program was located. There was no information on the actual contribution of hatchery fish to naturally-spawning populations.

Central Valley Steelhead

Central Valley steelhead once ranged throughout most of the tributaries and headwaters of the Sacramento and San Joaquin basins prior to dam construction, water development, and watershed perturbations of the 19th and 20th centuries (McEwan and Jackson 1996; CALFED 1999). In the early 1960s, the California Fish and Wildlife Plan estimated a total run size of about 40,000 adults for the entire Central Valley including San Francisco Bay (California Department of Fish and Game 1965). The annual run size for this ESU in 1991 to 1992, was probably less than 10,000 fish based on dam counts, hatchery returns and past spawning surveys (McEwan and Jackson 1996).

At present, all Central Valley steelhead are considered winter-run steelhead (McEwan and Jackson 1996), although there are indications that summer steelhead were present in the Sacramento River system prior to the commencement of large-scale dam construction in the 1940's (IEP Steelhead Project Work Team 1999). McEwan and Jackson (1996) reported wild steelhead stocks appear to be mostly confined to upper Sacramento River tributaries such as Antelope, Deer, and Mill creeks and the Yuba River. However, naturally-spawning populations are also known to occur in Butte Creek, and the upper Sacramento mainstem, Feather, American, Mokelumne, and Stanislaus rivers (CALFED 1999). It is possible that other naturally-spawning populations exist in Central Valley streams, but are undetected due to lack of monitoring and research programs. The recent implementation of new fisheries monitoring efforts has found steelhead in streams previously thought not to contain a population, such as Auburn Ravine, Dry Creek, and the Stanislaus River (IEP Steelhead Project Work Team 1999).

Snake River Steelhead

There are ten populations within the ESU. The primary BRT conclusion identified in the 1998 status review as reported in NOAA Fisheries (2003a) was a sharp decline in natural stock returns in the mid-1980s. The high proportion of hatchery fish in the run was also identified as a concern. Annual estimates of steelhead returns to specific production areas within the Snake River are generally not available. Annual run estimates are limited to counts of the aggregate return over Lower Granite Dam, which remained at relatively low levels through the 1990s. The 2001 run size at Lower Granite Dam was substantially higher than the 1990s. Overall, long-term trends for four of the nine available series remained negative. Short-term trends improved relative to the period analyzed for the previous status review. The Idaho Department of Fish and Game concluded that Idaho steelhead failed to meet replacement for most generations since 1985, based upon parr density survey results through 1999 (this did not include information on the increased returns for 2001 and 2002). Hatchery programs for steelhead production continue. Tucannon River artificial production switched to a local brood stock beginning with the 1999/2000 cycle year.

2.1.1.5 Snake River Sockeye

This ESU was listed amid uncertainty as to whether or not the Redfish Lake sockeye were a distinct population from kokanee that are present in relatively large numbers in the lake. From 1991 to present investigations have determined that there is a component of the kokanee population in Redfish Lake that spawn at the same time and place as the sockeye and are termed "residual" sockeye salmon. Otolith evaluations have determined that many of the outmigrants from Redfish Lake had a resident female parent.

Annual adult returns to Redfish Lake Creek weir have ranged from 0 to 8 from 1988 to 1998, and from 7-257 from 1999 to 2002. The latter four years reflect progeny of the captive brood stock program, which has been in place for this ESU since 1991. Releases of progeny from the brood stock program have been made in Pettit Lake and Alturas Lake in attempts to establish separate populations.

2.1.2 Status of the Species within the Action Area

Section 2.1.2 of this Opinion provides a definition and description of the Action Area. NOAA Fisheries is currently updating the status of 26 ESA-listed ESUs of salmon and steelhead and summarizing the findings in NOAA Fisheries (2003a). Using a risk-matrix method to quantify risks in different categories within each ESU, the report arrived at the following conclusions regarding the status of the species in the Action Area:

> For the following ESUs, the majority BRT conclusion was "in danger of extinction": Upper Columbia spring-run chinook, Sacramento River winter-run chinook, Upper Columbia steelhead, Southern California steelhead, California Central Valley steelhead, Central California Coast coho, Lower Columbia River coho, Snake River sockeye.
>
> For the following ESUs, the majority BRT conclusion was "likely to become endangered in the foreseeable future": Snake River fall-run chinook, Snake River spring/summer-run chinook, Puget Sound chinook, Lower Columbia River chinook, Upper Willamette River chinook, California Coastal chinook, Central Valley spring-run chinook, Snake River steelhead, Middle Columbia River steelhead, Lower Columbia River steelhead, Upper Willamette River steelhead, Northern California steelhead, Central California Coast steelhead, South-Central California Coast steelhead, Oregon Coast coho, S.Oregon/N. California Coast coho, Lake Ozette sockeye, Hood Canal summer-run chum, and Lower Columbia River chum.

In a number of ESUs, adult returns over the last one to three years have been significantly higher than have been observed in the recent past, at least in some populations. The BRT found these results, which affected the overall BRT conclusions for some ESUs, to be encouraging. For example, the majority BRT conclusion for Snake River fall chinook salmon was "likely to become endangered," whereas the BRT concluded at the time of the original status review that this ESU was "in danger of extinction." This change reflects the larger adult returns over the past several years, which nevertheless remain well below preliminary targets for ESA recovery.

In the Upper Columbia River, the majority BRT conclusions for spring chinook salmon and steelhead were still "in danger of extinction," but a substantial minority of the votes fell in the "likely to become endangered" category. The votes favoring the less severe risk category reflect the fact that recent increases in escapement have at least temporarily somewhat alleviated the immediate concerns for persistence of individual populations, many of which fell to critically low levels in the mid 1990s.

Overall, although recent increases in escapement were considered a favorable sign by the BRT, the response was uneven across ESUs and, in some cases, across populations within ESUs. Furthermore, in most instances in which recent increases have occurred, they have not yet been sustained for even a full salmon/steelhead generation. The causes for the increases are not well understood, and in many (perhaps most) cases may be due primarily to unusually favorable conditions in the marine environment rather than more permanent alleviations in the factors that led to widespread declines in abundance over the past century. In general, the BRT felt that ESUs and populations would have to maintain themselves for a longer period of time at levels considered viable before it could be concluded that they are not at significant continuing risk."

2.1.3 Environmental Baseline

The environmental baseline represents the current conditions to which the effects of the proposed or continuing action would be added. It "includes past and present impacts of all Federal, State, or private activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have undergone formal or early § 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in process (50 CFR § 402.02). The environmental baseline analysis includes a summary of the status of threatened and endangered species in the action area.

50 CFR §402.02 defines action area as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the purposes of this Opinion, the action area includes those portions of the administrative units discussed in section 1.2 managed under the NWFP and within the range of anadromous salmonids and river reaches downstream of the administrative unit boundaries that may be affected by Federal land management activities covered by the subject RMPs.

2.1.3.1 Environmental Baseline Conditions Prior to NWFP Implementation

The environmental baseline for the action area has been described in various documents. The Forest Ecosystem Management Assessment Team report (FEMAT 1993) provides a regional assessment of aquatic ecosystems within the range of the northern spotted owl, particularly with regard to land management actions. Chapter V of that document focuses on the then current aquatic habitat conditions and the effects of degraded habitat on fish populations. Page V-2 of FEMAT notes that "[a]quatic ecosystems in the range of the northern spotted owl exhibit signs of degradation and ecological stress." Aquatic habitat degradation has resulted from a wide range of land- and water-use practices including timber harvest, road construction, mining, grazing, agriculture, construction and operation of dams, irrigation, and flood control (Busby *et al.*1996, Spence *et al.* 1996). These activities (with the exception of agriculture) occur on NF and BLM lands within the subject species ESUs.

In general, these previous land management activities have: (1) Reduced connectivity between streams, riparian areas, flood plains, and uplands; (2) significantly increased sediment yields, leading to pool filling and reduction in spawning and rearing habitat; (3) reduced or eliminated instream replenishment of large woody debris, which serves to trap sediment, stabilizes stream banks, forms pools, and provides cover; (4) reduced or eliminated vegetative canopy that minimizes stream temperature fluctuations; (5) reduced stream complexity by causing streams to become straighter, wider, and shallower, which in turn reduces spawning and rearing habitat and increases temperature fluctuations; (6) altered peak flow volume and timing; (7) altered watertables and base flow; and (8) contributed to degraded water quality by adding toxicants through mining and pest control (FEMAT 1993, Rhodes *et al.* 1994, Spence *et al.* 1996).

Within the range of the northern spotted owl, timber harvest and associated activities (including road building) are among the most significant management actions that affect fish habitat on Federal land. However, within the central valley of California the overall habitat problems within the CV steelhead ESU are primarily a result of water development and associated blockages of previously available habitat, inadequate flows, flow fluctuations, and entrainment into diversions (McEwan and Jackson 1996). Prior to construction of dams in the central valley, 6,000 miles of anadromous fish habitat were available. Today, approximately 300 miles of habitat are available, a 95% reduction. Central Valley Project and State Water Project operations have resulted in reverse flows in the Sacramento Delta and in decreased steelhead survival. Flood control operations at dams such as Folsom Dam on the American River have also resulted in decreased steelhead survival. Additionally, toxic substances are released into the Sacramento River from an inactive mining operation.

In summary, the decline of listed salmonid populations in the action area has resulted from a variety of activities including hydropower development, harvest, artificial propagation, timber management (and associated road construction), mining, irrigation diversions, livestock grazing, urbanization, periods of drought, poor ocean conditions, and marine mammal predation. The principle ways in which previous land management policies have contributed to the decline of salmon habitat include: (1) Overemphasis on production of non-fishery commodities resulting in losses of riparian and fish habitat; (2) failure to take a biologically conservative or risk-averse approach to planning land management actions when inadequate information exists about the relationship between land management actions and fish habitat; (3) planning land management activities on a site-specific basis rather than on a broader, watershed scale; and (4) reductions in the number, size, and distribution of remaining high-quality habitat areas (such as roadless and minimally developed areas) that serve as biological refugia for anadromous fish subpopulations (FEMAT 1993, Rhodes *et al.* 1994).

2.1.3.2 Environmental Baseline Conditions Subsequent to NWFP Implementation

Previous ESA Consultations

Numerous BLM and USFS administrative units have concluded ESA consultations on continued implementation of their RMPs as previously amended by or incorporating the NWFP, for ESA-listed fish species prior to the proposed ACS amendment. The consultation or conference history is provided in Table 3 and Table 4 of the BA, and in section 1.1 of this Opinion. The BAs and reinitiation letters for the prior consultations described the effects of the continued implementation of the RMPs on the environmental baseline as well as on the ESA-listed fish species (USDA 1995a, 1995b, 1995c, 1995d, 2000; USDA and USDI 1997a, 1997b, 1998, 1999). The above consultation documents effectively updated environmental baseline conditions in the respective geographical areas, and the opinions each concluded that implementation of the NWFP would not "jeopardize" the listed salmon pursuant to section 7 of the ESA, or result in destruction or adverse modification of designated critical habitat.

Implementation of the RMPs

The USFS and BLM generate annual monitoring and accomplishment reports. These reports are discussed below by subject (in italics), and demonstrate implementation of the RMPs as amended by the ACS of the NWFP since 1994.

Implementation Monitoring - A regional-scale NWFP implementation monitoring (NWFPIM) program has been in place since 1996. The purpose of the field monitoring program is to determine whether the 1994 ROD and its corresponding S&Gs are being consistently followed across the range of the Plan. This program is conducted under the direction of the Regional Interagency Executive Committee (RIEC). Section 3.2.1 of the BA provides a detailed discussion of the NWFPIM program and results.

Since its inception in 1996 through 2001, 138 timber sales, 63 watershed analyses, 24 road projects, 18 restoration projects, 4 fuel reduction projects, and several other individual activities have been monitored. To date, there has been greater than 95% compliance with meeting the S&Gs for the monitored activities. Section 3.2.1 of the BA contains a summary of the NWFPIM reports for those years (Regional Ecosystem Office 1997, 1998, 1999).

Restoration - Restoration is one of the primary components of the NWFP ACS. The restoration accomplishments for the Oregon and Washington administrative units are displayed below for a four year period, 1998 to 2001; the California administrative units, the Klamath, Mendocino, Six Rivers, Shasta-Trinity, Arcata, Redding and Ukiah NFs, display accomplishments for an eight year period, 1994 to 2001 (Table 6). The 1994 to 1997 restoration accomplishments for the Oregon and Washington administrative units were included in previous RMP consultations (Tables 1 and 2) or are displayed in the 1999 addendum (USDA and USDI 1999) to the 1997

BA (USDA and USDI 1997). The restoration accomplishments for the King Range National Conservation Area are included with the Arcata administrative unit. Data was not collected for the Modoc and Lassen NFs because the listed species or critical habitat addressed in this Opinion are not affected by those Forest's RMPs.

Table 6. Summary of Aquatic Restoration Accomplishments by USFS and BLM Administrative Units During a Four-Year Period (1998 to 2001) Excepting the Klamath, Mendocino, Six Rivers, Shasta-Trinity, Arcata, Redding, and Ukiah Units that Display Accomplishments for and Eight-Year Period (1994 to 2001). The values for Arcata administrative include the King Range National Conservation Area. "ND" means no data is available.

Administrative Unit	Instream Structures (mi.)	Instream Passage (mi.)	Riparian (ac.)	Riparian (mi.)	Upland (ac.)	Decommissioned Roads (mi)	Road Improved (mi.)	Wetland Fresh (ac.)
Columbia River Gorge NSA	3	0	375	0	0	6	3	137
Deschutes	26.3	0.7	513	30.5	529	104.3	15.4	207
Gifford Pinchot	178.3	1.1	1508	21.7	11	285.8	193.3	0
Klamath	325	ND	ND	ND	2907	136.2	ND	ND
Lassen	ND	ND	ND	ND	ND	ND	ND	ND
Mendocino	67	ND	ND	ND	567	62	ND	ND
Modoc	ND	ND	ND	ND	ND	ND	ND	ND
Mount Baker Snoqualmie	8.4	0.5	13	0	1	54.4	137.6	0
Mount Hood	50.3	24.1	176	13.3	309	42.4	16.1	4
Okanogan	0.6	0.2	15	1.3	47	24.2	19.2	0
Olympic	0.8	4.3	82	9.9	368	46.7	33.9	0
Rogue River	44.5	55	628	0	99	26.5	12.9	1
Six Rivers	120	ND	ND	ND	711	137	ND	ND
Siskiyou	62.8	39	2833	0	0	57.7	0	0
Shasta-Trinity	244	ND	ND	ND	1980	112.4	ND	ND
Siuslaw	40.2	0	70	1.9	0	34.4	10.6	0
Umpqua	12.3	3	11	2.3	4099	85.6	110	0
Wenatchee	8.3	27	337	63.6	4	91.9	92.2	18
Willamette	18	0	613	38.7	1784	43.4	65.1	7
Winema	0.3	0	0	0	1	150.1	0.2	0
Arcata	ND	ND	ND	ND	ND	33.5	ND	ND
Coos Bay	12.2	25.1	1533	0.3	0	28.8	2.1	0
Eugene	7.7	8.2	11	3.1	0	5.3	0.9	0
Klamath Falls	0	0	273	1.5	738	0.3	1.4	3
Medford	5.3	147.3	463	6.3	4	37.6	173.2	0
Redding	ND	ND	ND	ND	ND	21.9	ND	ND
Roseburg	4.3	33.8	11	0	0	14	62.2	0
Salem	12.1	9.5	1606	8	12	127.8	52	0
Ukiah	0.5	0	0.5	0.8	0	0	0	0
Totals	1252.2	378.8	11071.5	203.2	14171	1770.2	1001.3	377

Watershed Analysis - WA is also a primary component of the NWFP ACS. WA is required for Key Watersheds, roadless areas in non-Key Watersheds and Riparian Reserves before initiating all but minor actions. Sixteen administrative units have completed watershed analyses for 90% or more of the Federal land area covered by their RMPs including 7 units with 100% accomplishment (Table 7). Four administrative units have completed Watershed Analysis over 80 to 89% of the Federal land covered by their RMPs, and four additional administrative units have completed Watershed Analysis over 50 to 79% of their Federal land (Table 7). Three administrative units have completed WA for less than 50% of their unit area. WA accomplishment data was not compiled for the Modoc and Lassen NFs since the listed species or critical habitat addressed in this Opinion are not affected by those Forest RMPs. The WA accomplishments for the King Range National Conservation Area are included in the values for the Arcata administrative unit.

WA has been completed by the administrative units for the vast majority of Key Watersheds in the NWFP area. The CRGNSA and the Ukiah Resource Area are the only units that do not have any designated Key Watersheds. WA has been completed for 100% of the Key Watersheds on 19 administrative units (Table 7). Six administrative units have completed watershed analyses for 67 to 91% of their Key Watershed areas (Table 7). Small Federal land ownership, lack of cooperators, and/or lack of project activity made these Key Watersheds a low priority for WA.

WA has been completed for the vast majority of the inventoried roadless areas in the NWFP area. Inventoried roadless areas occur only on National Forest lands in the NWFP area. WA has been completed for 100% of the inventoried roadless areas in non-Key Watersheds on 10 administrative units. Eight administrative units have not completed WA for inventoried roadless areas in non-Key Watersheds. Like Key Watersheds, WA is a low priority for many inventoried roadless areas in non-Key Watersheds due to small Federal land ownership, lack of cooperators, land allocation designation, and/or lack of planned project activity. As mentioned above, data was not collected for the Modoc and Lassen NFs.

Generally, use of a detailed WA for decision-making is beneficial for ESA-listed fish species. WA provides information useful for establishing the environmental baseline used in Section 7 consultations and also forms the basis and context for project design consistent with the ACS.

System Road Network - NOAA Fisheries has identified roads as one of the most pervasive management activities affecting listed fish species and habitat. The current system road mileage for the administrative units is listed in Table 7. The database for the USFS system roads is tracked by NFs, therefore the databases for NFs with lands outside the NWFP area include system road mileage from these non-NWFP areas also. Of the 10 USFS administrative units with non-NWFP areas, the Deschutes, Okanagon, and Winema NFs are at least 28% or more non-NWFP area. The CRGNSA, Wenatchee, Klamath, Mendocino, and Shasta Trinity administrative units are less than 5% non-NWFP. The Modoc and Lassen NFs are primarily non-NWFP areas. The BLM administrative units system road mileage is only NWFP area.

Table 7. Completed Watershed Analyses. Percentage of USFS and BLM Administrative Units and Key Watershed Area with Completed Watershed Analyses.

Administrative Unit	Federal Land Area with Completed Watershed Analyses (%)	Key Watershed Area with Completed Watershed Analyses (%)
Columbia River Gorge National Scenic Area	83.3	Not Applicable
Deschutes	82.9	100
Gifford Pinchot	99.1	100
Klamath	71	86
Lassen	No Data	No Data
Mendocino	93.1	100
Modoc	No Data	No Data
Mount Baker Snoqualmie	66.2	71
Mount Hood	100	100
Okanogan	100	100
Olympic	80.4	91
Rogue River	100	100
Six Rivers	80.7	85
Siskiyou	99.9	100
Shasta-Trinity	56.4	100
Siuslaw	98	100
Umpqua	98.5	82
Wenatchee	100	100
Willamette	100	100
Winema	55.7	100
Arcata	33.5	67
Coos Bay	93.1	100
Eugene	96.1	100
Klamath Falls	100	100
Medford	93	100
Redding	43.6	100
Roseburg	100	100
Salem	97.1	100
Ukiah	37	Not Applicable

Implementation of the USFS and BLM RMPs as amended by the NWFP has resulted in changes to system road mileage as displayed in Table 8. However, the availability of databases to display changes to the system road network varies by agency, State or Regional office, and individual administrative unit. The BLM administrative unit's net changes to road mileage in Table 8 represent time period differences from year 2000 to 2003 except for the Arcata and Redding units, which display changes from 1994 to 2003. The system road mileage for the King Range National Conservation Area is included with the Arcata administrative unit.

The time period used to display net changes to road mileage by administrative unit for the USFS differ by region and administrative unit. The Oregon and Washington administrative units display differences for a 10-year period, 1993 to 2002; whereas the California administrative units vary for the most part by NF: the Klamath (1993 to 2002), Six Rivers (1994 to 2002), Mendocino and Shasta-Trinity (2000 to 2002). The CRGNSA road mileage was not tracked separately from the Mt. Hood and Gifford Pinchot NFs until recently, therefore net changes are not displayed. Data was not collected for the Modoc and Lassen NFs since the listed species or critical habitat addressed in this Opinion are not affected by those NFs.

Overall, the system road mileage has been reduced in the NWFP area since the adoption of the NWFP ACS. The net system road mileage has been reduced 4307 miles which represents a 4.7% reduction (Table 7). However, as noted above, the initial reference years are variable. The system road mileage was reduced on 17 administrative units and was increased on 9 units. Information on the net change to road mileage is not presented for 4 units but this is inconsequential since the units would have either no effect to the listed species (Lassen and Modoc) or has relatively small road networks (Ukiah and CRGNSA).

Nine administrative units display a net increase in system road mileage. The reasons for individual USFS administrative unit increases to system road mileage are primarily a result of efforts to update the inventory of system roads but also are associated with land exchanges and/or acquisitions of private land for some administrative units.

Corrections have been made to existing Forest Service roads that had incorrect mileages recorded in the database. A number of "ghost roads" that were previously uninventoried have entered into the database. Also with such large databases on the NFs, errors are going to be uncovered and corrected from time to time.

Despite some explainable increases in milage, the decreasing trend is consistent with ACS restoration expectations and assumptions NOAA Fisheries has made in previous biological opinions, and indicate improving environmental baseline conditions and movement toward attainment of ACS objectives.

Timber Harvest - The NWFP established the term "Probable Sale Quantity" (PSQ) for estimates of average annual timber sale levels likely to be achieved. The NWFP FSEIS (USDA and USDI 1994a, Chapter 3 & 4, Page 267) addressed the potential for the PSQ to change as USFS and BLM District plans were completed or revised:

"Sustainable sale estimates will be made using more refined data and procedures available when Draft Forest and District Plans are completed or current plans are revised."

The NWFP assumed that 90% of the early decades PSQ would come from late-successional and old growth forest, much of it through regeneration harvest. Individual RMPs outline assumptions for the amount and timing of silvicultural prescriptions such as thinning, partial cutting, and regeneration harvesting. The planning assumptions are based on the type of forests and the mix of older and younger forests available for harvest within each administrative unit. Achievement of PSQs for the individual administrative units, and for the NWFP area as a whole, are contingent on the ability to implement the full range of silvicultural prescriptions outlined in individual RMPs.

The NWFP FSEIS (Chapter 3&4, Pages 266 and 268) estimated the PSQ at 958 million board feet (MMBF), plus an additional 10% volume estimated in "other wood" (cull, sub-merchantable, firewood, and other products) for a total of 1.1 billion board feet. By 1998, PSQ across the NWFP area was reduced by 15%, to 811 MMBF. Revised Riparian Reserves acreage estimates at the local administrative unit level, was the single largest factor for the reductions in PSQ. It was determined that more of the landscape was in Riparian Reserves and therefore not available to contribute to the PSQ.

Since the adoption of the NWFP in 1994, the actual timber sale offerings has been less than the annual PSQ for all years. Since 1999, the agencies offerings have been reduced to only 35% of the PSQ. The reduction in sale offerings are the result of appeals and protests on individual projects, enjoined biological opinions as a result of litigation, and implementation of the Survey and Manage mitigation measures, among other reasons.

The FSEIS for the NWFP area and previous BAs for the RMPs displayed and discussed how the PSQs at the NWFP and individual RMP levels were reduced by the adoption of the NWFP. For example, the PSQ was reduced by 65 to 93% for the RMPs in Oregon and Washington. Additional information regarding PSQs for individual RMPs can be obtained from the previous BAs and biological opinions (Table 3).

Table 8. Status of System Road Mileage by Administrative Unit Within the NWFP Area. Road miles represent the sum of all system road classes. "ND" mean no data is available. Negative values are displayed within the <> symbols.

Administrative Unit	System Road Network Changes		Current System Road Network (mi)
	Net Mileage	Net Percentage	
Columbia River Gorge NSA	ND	ND	138
Deschutes	<194>	<2.2>	8529
Gifford Pinchot	<205>	<4.7>	4114
Klamath	<730>	<14.9>	4177
Lassen	ND	ND	ND
Mendocino	27	1.1	2491
Modoc	ND	ND	ND
Mount Baker Snoqualmie	<343>	<11.4>	2654
Mount Hood	<339>	<8.7>	3566
Okanogan	38	1.4	2706
Olympic	<300>	<12.1>	2178
Rogue River	<268>	<9.5>	2547
Six Rivers	280	10.7	2903
Siskiyou	<186>	<6.3>	2765
Shasta-Trinity	104	1.6	6547
Siuslaw	<243>	<9.6>	2298
Umpqua	<73>	<1.5>	4806
Wenatchee	585	11.5	5652
Willamette	73	1.1	6491
Winema	61	1.0	6283
Arcata	<34>	ND	ND
Coos Bay	<872>	<29.2>	2114
Eugene	<705>	<24.4>	2182
Klamath Falls	<129>	<28.9>	319
Medford	<455>	<8.6>	4826
Redding	<22>	<8.4>	239
Roseburg	614	20.5	3615
Salem	<991>	<27.3>	2637
Ukiah	ND	ND	36
TOTAL	<4307>	<4.7>	86813

There are many 1994 ROD S&Gs for timber harvest and related silviculture actions that directly or indirectly benefit Pacific salmonids. For example; 1994 *ROD* pages C-7, C-11 through 16, C-19 through 28, C-30 through 32, and C-39 through 48. NOAA Fisheries has previously determined that programs managed under the NWFP, including timber harvest as conditioned by the above S&Gs, would not jeopardize the continued existence of listed salmon. Additionally, NOAA Fisheries stated in its 1997 opinion:

"As a result of the various reserve allocations included in the LRMPs and RMPs, scheduled timber harvest is now limited to a relatively small percentage of the overall landscape within lands designated as "matrix" and Adaptive Management Area (AMA). A relatively large percentage of this land area is located in tier 1 Key Watersheds, which could further reduce timber harvest since Key Watersheds have an aquatic conservation emphasis and are to be managed as refugia for at-risk fish species."

Effectiveness Monitoring - The ACS requires monitoring of aquatic ecosystems. The AREMP was developed to fulfill this requirement. The final monitoring plan was approved in March 2001. The monitoring plan was designed to assess the condition of aquatic, riparian, and upslope ecosystems; develop ecosystem management decision support models to refine indicator interpretation; develop predictive models to improve the use of monitoring data; provide information for adaptive management by analyzing trends in watershed condition and identifying elements that result in poor watershed condition; and provide a framework for adaptive monitoring at the regional scale (Reeves et al. 2001). Monitoring is conducted at the subwatershed scale (USGS 6th-field hydrologic unit code). Subwatersheds are approximately 10,000-40,000 acres in size.

Sampling a minimum of 50 subwatersheds annually in the Forest Plan area will support regional analyses of ACS effectiveness. Over a five-year period, a total of 250 watersheds would be sampled (approximately 10% of the estimated number of subwatersheds). Post-sampling stratification will allow an evaluation at the subregional scale (*e.g.*, provinces, river basins, National Forests, BLM districts) after five years. The AREMP conceptual framework allows more intense sampling than this, if managers wish to dedicate resources to deduce the Forest Plan's effectiveness at smaller spatial scales. Generally, at least 50 units would need to be sampled at the scale desired to provide the necessary statistical rigor.

Under the AREMP conceptual framework, watersheds are stratified into three primary subsystems (channel, riparian, and upslope), each containing an array of physical and biological indicators that define its condition. Watershed condition is assessed by analyzing indicator values using a decision support model (DSM) incorporating relationships developed by provincial and regional experts. Results will be presented in the form of frequency distributions of the regional aggregation of watershed condition. Status and trend of individual indicator values will also be reported. Trend will be assessed by evaluating status of individual watersheds and indicators over time. If the ACS is effective, the frequency distribution of watersheds or indicators should shift towards the better condition categories. Because the watershed processes, upon which the NWFP is based, operate over long timeframes (decades to centuries), trends may not be observed for 10 to 20 years. Reports on status can be generated every year, but meaningful trends are more likely to be detected on a decadal timeframe. Depending on the intensity of sampling selected by agency managers, insight about ACS effectiveness at subregional scales or upon certain management practices could be available sooner.

A pilot project was conducted during the 2001 field season to test whether intensive sub-sampling could adequately characterize watersheds and to establish a data quality assurance program. Protocols for conducting upslope and riparian vegetation and roads analyses were also developed. Finally, a decision support model was constructed to evaluate the condition of individual sample reaches and watersheds. Collection of field data began in summer 2000 in four watersheds. The goal of the 2000 sampling was to test sampling protocols and determine the funding level and crew structure needed to implement the monitoring plan (Moyer *et al.* 2001). A pilot project was conducted in 2001 in 16 watersheds to continue the refinement of the protocols and to answer other questions related to implementing the monitoring plan.

Twenty-three watersheds were sampled in 2002 in the first year of full implementation. Funding was not sufficient to attain the goal to sample 50 watersheds. The 2002 effort implemented a quality assessment/quality control program, continued the refinement of data collection protocols, and resolved questions related to implementing the monitoring plan. Full implementation program costs were refined (Lanigan, personal communication 2003).

Environmental Factors - In the FSEIS for the proposed ACS amendment (USDA and USDI 2003a), the agencies considered whether large wildland fires, floods, droughts or El Niño weather patterns occurring since 1994 changed the affected environment or environmental consequences described in the FEMAT report or the NWFP FSEIS. These natural episodic disturbance events are an integral part of process-based management contained in the ACS. As stated in the FEMAT report (page V-29) and the NWFP FSEIS (page B-81):

> "The heart of the approach is the recognition that fish and aquatic organisms evolved within a dynamic environment."

The NWFP provided an adaptive management approach to environmental conditions and events, and recognized that ecosystems are not static but are ever changing in response to conditions and events. The USFS and BLM determined that large fires, flood, drought and El Niño events occurring since 1994 are not changed conditions that would invalidate the four components of the ACS (WA, Watershed Restoration, Key Watersheds, Riparian Reserves). The NWFP and ACS require consideration of natural disturbances in land management decisions.

In summary, NOAA Fisheries has determined in earlier consultations (Tables 3 and 4) that implementation of the NWFP would not jeopardize listed salmonids or result in adverse modification of designated critical habitat. Subsequent implementation of the elements of the NWFP, as summarized above, supports our earlier conclusion, and we believe that habitat baseline conditions for anadromous salmonids within the action area have improved, and expect that they will continue to improve under the NWFP. This is based upon the results of the NWFP implementation monitoring, accomplishments under the Watershed Restoration program, completions of Watershed Analyses, reductions in system road milage, and the conditioning of timber sale, and other land management activities by the S&Gs and land use allocations consistent with the ACS objectives.

2.1.3.3 Status of the Species within the Action Area

NOAA Fisheries (1999) requires validation and discussion of the status of the affected ESUs in the action area. NOAA Fisheries is currently updating the status of 26 ESA-listed ESUs of salmon and steelhead and summarizing the findings in NOAA Fisheries (2003a). That update is summarized above in section 2.1.2.

2.1.4 Analysis of Effects

Pursuant to section 7(a)(2) of the ESA (16 U.S.C. §1536), Federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This Opinion assesses the effects of continued implementation of individual RMPs, as amended by the proposed action on the listed and proposed Pacific salmonids and their designated critical habitat (Table 3). In the Description of the Proposed Action section of this Opinion, NOAA Fisheries provided an overview of the action. In the Status of the Species and Environmental Baseline sections of this Opinion, NOAA Fisheries provided an overview of the threatened and endangered species and critical habitat that are likely to be adversely affected by the activity under consultation.

Regulations that implement section 7(b)(2) of the ESA require biological opinions to evaluate the direct and indirect effects of Federal actions and actions that are interrelated with or interdependent to the Federal action to determine if it would be reasonable to expect them to appreciably reduce listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution (16 U.S.C. §1536; 50 CFR 402.02). Section 7 of the ESA and its implementing regulations also require biological opinions to determine if Federal actions would destroy or adversely modify critical habitat (16 U.S.C. §1536).
NOAA Fisheries generally approaches "jeopardy" analyses in a series of steps. First, we evaluate the available evidence to identify the direct and indirect physical, chemical, and biotic effects of implementation of the program on individual members of listed species or aspects of the species' environment (these effects may include direct, physical harm or injury to individual members of a species; modifications to something in the species' environment - such as reducing a species' prey base, enhancing populations of predators, altering its spawning substrate, altering its ambient temperature regimes; or adding something novel to a species' environment - such as introducing exotic competitors or a sound). To discern these effects, we assess the objectives, principles, and requirements of the program to determine how specific actions are likely to be implemented under the program and how the overall program, including elements designed to monitor the effectiveness of the program, will impact the status and trends of the affected species. Once we have identified the effects of a program, we evaluate the available evidence to identify a species' probable response (including behavioral responses) to those effects to determine if those effects could reasonably be expected to reduce a species' reproduction, numbers, or distribution (for example, by changing birth, death, immigration, or emigration rates; increasing the age at which individuals reach sexual maturity; decreasing the age at which individuals stop reproducing; among others). We then use the evidence available to determine if

these reductions, if there are any, could reasonably be expected to appreciably reduce a species' likelihood of surviving and recovering in the wild. For critical habitat, we assess the effects of a program on areas and elements of critical habitat to determine if those effects could reasonably be expected to reduce the value or function of those affected areas or elements.

The RMPs present a special case for analyzing the effects of actions because in order to carry out activities on lands covered by the plans, the USFS and BLM have to conduct additional layers of environmental review to meet NFMA, NEPA, and ESA requirements. Even though RMPs set important parameters for the authorization of specific projects, they do not provide final authorization for project implementation. The analysis of effects in this Opinion shall include both the overall plan-level effects of implementing RMP management direction, as amended by the proposed action, and the potential on-the-ground effects of management actions consistent with the plans at various spatial and temporal scales. This latter discussion will be general in nature due to a lack of site-specific and project-specific information. Specifics on effects to listed salmonids from individual management actions will not be addressed, but rather a general overview of the potential effects that could be expected to occur due to implementation of management actions as directed under the RMPs will be provided.

Effects to salmonids at the site scale will be analyzed in future project-level section 7 consultations. To fulfill obligations under section 7(a)(2) of the ESA for individual or groups of projects and to be exempt from section 9 take prohibitions, the administrative units may use the interagency consultation streamlining guidance (1999), or subsequent updated procedures, and the Level I process, to avoid jeopardizing the continued existence of listed salmonids. Thus, the purpose of this Opinion is to analyze the guidance and direction provided by the RMPs and ACS to determine if the expected effects of implementation of the program are likely to result in an outcome that is likely to jeopardize listed species or destroy or adversely modify critical habitat.

2.1.4.1 Comparison of Attainment of ACS Objectives at the Watershed and Landscape Scales to Species Conservation and the Value of Critical Habitat

This subsection of the effects analysis will analyze the effects of implementation of the proposed action on listed salmonids and critical habitat relative to achievement of the ACS objectives at the watershed and landscape scales. The following information is excerpted from Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units (McElhany *et al.* 2000):

> "We define a viable salmonid population (VSP) as an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame. We define an independent population as any collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year time period are not substantially altered by exchanges of individuals

with other populations. In other words, if one independent population were to go extinct, it would not have much impact on the 100-year extinction risk experienced by other independent populations. Independent populations are likely to be smaller than a whole ESU. The ESA is not concerned with the viability of populations per se, but rather with the extinction risk faced by an entire ESU. A key question is how many and which populations are necessary for a sustainable ESU. Three factors need to be considered when relating VSPs to viable ESUs: (1) Catastrophic events, (2) long-term demographic processes, and (3) long-term evolutionary potential."

Concepts presented in McElhany *et al.* (2000) were utilized, in part, by the Willamette/Lower Columbia Technical Recovery Team (TRT) in the "Interim Report on Viability Criteria for Willamette and Lower Columbia Basin Pacific Salmonids" (McElhany *et al.* 2003). This interim report (McElhany *et al.* 2003) was prepared by the TRT to provide technical information to support the development of delisting criteria and focuses on the Willamette/Lower Columbia Basin WLC) recovery domain that includes five listed and one candidate ESU. The following excerpts from McElhany *et al.* (2003) regarding habitat criteria guidelines, although specific to the WLC recovery domain, are generally germane to Pacific salmonids, and therefore are concepts that can be applied to listed salmonids within the NWFP action area:

"1. The spatial distribution and productive capacity of freshwater, estuarine, and marine habitats should be sufficient to maintain viable populations identified for recovery.

2. The diversity of habitats for recovered populations should resemble historical conditions given expected natural disturbance regimes (*e.g.*, wildfire, flood, volcanic eruptions). Historical conditions represent a reasonable template for a viable population; the closer the habitat resembles the historical diversity, the greater the confidence in its ability to support viable populations.

3. At a large scale, habitats should be protected and restored, with a trend toward an appropriate range of attributes for salmonid viability. Freshwater, estuarine, and marine habitat attributes should be maintained in a non-deteriorating state.

Habitat, as used here, comprises the myriad environmental components and processes operating over time and space that affect the growth, behavior, distribution, and survival of individual salmonids and therefore the viability of salmonid populations. For all WLC listed salmon ESUs, habitat loss and destruction was identified at the time of listing as one of the major factors for decline. VSPs require an abundance of high-quality habitat, distributed throughout entire watersheds, including freshwater and estuarine areas, in a manner that will support all life-history stages and provide connectivity among the various life stages. Habitat conservation, restoration, and protection are essential components of salmon recovery."

The FSEIS of the ROD (1994) described the scale that the FEMAT scientists thought was appropriate for the ACS to be successful:

> "To succeed, any aquatic conservation strategy must strive to maintain and restore ecosystem health at watershed and landscape scales. Thus, this is the approach of the Aquatic Conservation Strategy. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds."

The 1994 ROD, as modified by the proposed ACS amendment retains language within Riparian Reserve S&Gs on pages C-32 through C-38 that requires land managers to develop programs and conditions projects to "attain" or "meet" Aquatic Conservation Strategy objectives, or to ensure that "Aquatic Conservation Strategy objectives are not adversely affected.." The 2004 ROD, as discussed in the March 17 2004, letter from the USFS and BLM clarifies that, in these S&Gs, "... the Aquatic Conservation Strategy Objectives apply only at fifth-field watershed and larger scales, are achieved only over a period of decades or longer, and do not provide additional direction constraining the short-term or long-term effects of individual projects." Thus, 2004 ROD clarifications notwithstanding, the requirements for consistency with the ACS delineated on pages C-32 through C-38 will ensure attainment of ACS objectives at the fifth field or larger scales, which is consistent with McElhany *et al.* (2003) who stated that, "(A)t a large scale, habitats should be protected and restored, with a trend toward an appropriate range of attributes for salmonid viability. Freshwater, estuarine, and marine habitat attributes should be maintained in a non-deteriorating state."

When consulting at the RMP level, NOAA Fisheries must consider more than just the response of the listed species and their critical habitat relative to achievement of the goals and objectives at the fifth-field watershed over the long term. The initial response of individuals of the species and their critical habitat relative to implementation of individual RMP actions will occur at a spatial scale that is much smaller than the scale associated with attainment of the ACS objectives. Impacts to listed species and their habitat at scales smaller than the fifth-field watershed are greatly influenced by site-specific conditions, project design, and implementation. Thus, impacts at smaller scales are more appropriately analyzed during future consultations on individual or groups of actions. However, as part of this plan level consultation we will examine how the ACS will be implemented to determine likely effects to salmonids and their critical habitat during the course of project implementation.

2.1.4.2 Effects of Individual and Groups of Actions

Individual and groups of actions (programs or projects) implemented in accordance with management direction in the RMPs are expected to affect listed species and their critical habitat in a variety of ways. The following provides a general overview of potential effects to listed salmonids or their critical habitat associated with actions expected to be implemented under the RMPs. The RMPs cover a variety of management actions. However, this Opinion only analyzes a few categories of actions, concentrating on actions that are commonly implemented across the action area and have a high potential to adversely affect listed salmonids and their critical habitat. Later subsections of the Effects of the Action section will analyze various components of the ACS, including how the implementation of the ACS components and S&Gs ameliorate the impacts resulting from these land management activities. Further, in addition to the project-specific direction, guidance and constraints on project design provided by the ACS, individual and groups of actions will each be subject to project-level ESA consultations and the terms and conditions imposed in subsequent incidental take statements.

A watershed conveys three products that influence the form and function of a stream. These three products are water, sediment, and wood. The following is from Reid (1998):

> "If the amount of water, sediment, or wood introduced into the channel changes, the channel form changes to reflect the new balance among these components, changing both the nature of the habitat available for use by salmon and the stability of downstream channels. In addition, a change in any one of the components -water, wood or sediment- will induce a change in the other components. Increased flow increases sediment transport and decreases the stability of large debris; increased sediment input decreases channel capacity, increasing flood peaks and burying woody debris; decreased woody debris increases sediment transport rates and speeds flow rates. Downstream impacts occur from changes in channel form, sediment transport, water flow, or woody debris load."

The preceding summary of watershed products, and their influence on the form and function of a stream channel sets the stage for the discussion of the potential effects management actions could have on listed salmonids.

Forest Management

Forest management includes all activities associated with the access, removal, and re-establishment of forest vegetation, including road construction, timber harvest, site preparation, planting, and intermediate silvicultural treatments. This analysis begins by determining potential effects forest management may have on watershed products, and is then followed by the effects those changes in watershed products may have on listed salmonids and their critical habitat.

The effects of timber harvest and forest roads on salmonids and their habitat have been documented in Meehan (1991), Spence *et al*. (1996), and NOAA fisheries (1997d). Timber harvest has the potential to reduce streamside canopy levels which may result in increased stream temperatures and reduce the supply of large woody debris; and accelerate surface erosion and mass wasting causing increased sediment delivery and turbidity in streams. Timber harvest often alters a normal stream flow pattern, particularly the volume of peak flow (maximum volume of water in the stream) and base flow (the volume of water in the stream representing the groundwater contribution) by reducing the number of trees. The degree these parameters change depends on the percentage of total vegetative cover removed from the watershed and the amount of soil disturbance caused by the ground-disturbing activities (NOAA Fisheries 1996c).

The principal aquatic consequences of timber felling and yarding are changed rates of sediment and nutrient delivery, and altered levels of temperature and dissolved oxygen (Meehan 1991). Forest harvest activities can influence both upland erosional processes and the way that forest streams process sediment within channels (Chamberlin *et al.* 1991). The degree of influence varies with geology, climate, vegetation, dominant geomorphic processes, and land uses (Anderson 1971). The potential for surface erosion is directly related to the amount of bare compacted soil exposed to rainfall and runoff. Hence, road surfaces, landings, skid trails, ditches, and disturbed clear-cut areas can contribute large quantities of fine sediments to stream channels (Chamberlin *et al*. 1991). Harvesting, especially with heavy equipment, removes the humic layer, increasing surface erosion. Yarding and heavy equipment use compacts soil, channelizing surface runoff (Spence *et al*. 1996). Root strength is lost as stumps decompose after logging, leading to slumps, landslides, and surface erosion (Everest *et al*. 1987). Removing trees from the banks of streams cause these banks to destabilize, increasing sediment delivery into streams. Vegetation immediately adjacent to the stream channel is the most important to maintaining bank integrity (FEMAT 1993); however, in wide valleys, floodplain vegetation is important over longer time periods.

Mechanical thinning operations lack much of the ground disturbing effects of full scale logging. Canopy cover remains when the large trees are not cleared, resulting in minimal effects to stream temperatures. Furthermore, the remaining trees and shrubs minimize erosion and provide stream side stability to the treated area. There is less soil compaction because large trees are not felled and yarded, and the smaller trees are yarded to a landing whole, causing less ground disturbance than dragging a log across the ground. In other circumstances, the remaining slash is treated on site with lop and scatter to improve soil cover or burned in small handpiles. There are less dramatic changes to peak-base flows because stands remain well stocked after treatment.

Additionally, riparian buffers can reduce the amount of sediment delivered from riparian and upland areas by providing physical barriers to trap sediments moving overland during rainfall events and by providing root stability to reduce the likelihood of mass failures along the stream channel (Spence *et al*. 1996). Various studies have suggested different buffer widths necessary to control overland sediment flow and minimize streambank mass wasting events. The review prepared by Johnson and Ryba (1992) noted that the available literature reported buffer widths ranging from 50 to 151 feet to control sediment, but that three of the five references they reviewed suggested 100 feet for this function. These buffer widths focused on minimizing overland flow, but O'Laughlin and Belt (1994 cited in Spence *et al*. 1996) suggested that sediment control from timber harvest activities cannot be achieved through riparian zones alone, because channel erosion and mass wasting are significant sources of sedimentation in forested streams. Therefore, additional buffers around areas susceptible to mass wasting would be necessary to provide full protection from upland and riparian sediment sources caused by timber harvesting. The ACS (1994) provides for these additional buffers, "(R)iparian Reserves include the body of water, inner gorges, all riparian vegetation, 100-year floodplain, landslides and landslide prone areas."

Roads may have unavoidable effects on streams, no matter how well they are located, designed or maintained (FEMAT 1993). Roads can affect streams directly by accelerating erosion and sediment loadings, by altering channel morphology, and by changing the runoff characteristics of watersheds (Furniss *et al.* 1991). Hauge *et al.* (1979) discussed several ways that roads can affect hillslope drainage, including changes in infiltration rates, interception and diversion of subsurface flow, changes in the watershed area of small streams, changes in the time distribution of water yield to channels, and changes in fine (micro) details of drainage. Gibbons and Salo (1973 *op cit* Furniss 1991) found that sediment contributions per unit area from roads is much greater than that from all other land management activities combined, including log skidding and yarding. In general, roads have been a primary source of sediment impacts in developed watersheds (Everett *et al*. 1994; Rhodes *et al*. 1994; Wissmar *et al*. 1994). Furniss *et al*. (1991) stated that:

> "Roads modify natural drainage networks and accelerate erosion processes. These changes can alter physical processes in streams, leading to changes in streamflow regimes, sediment transport and storage, channel bank and bed configurations, substrate composition, and stability of slopes adjacent to streams. These changes can have important biological consequences, and they can affect all stream ecosystem components These effects can be greatly reduced if the protection of fish habitat is integrated into the planning, design, construction, and maintenance of roads."

Megahan (1987) indicates that, without exception, road construction accelerates surface erosion rates compared to undisturbed conditions. According to this study, sedimentation increases greatly during and after road construction, and then decreases rapidly. However, surface erosion rates and sedimentation generally continue to exceed undisturbed conditions.

The relatively impermeable surfaces of roads cause surface runoff that bypasses longer, slower subsurface flow routes (Harr *et al*. 1975, 1979; Ziemer 1981; Wemple 1994). The longevity of changes in hydrologic processes resulting from forest roads is as permanent as the road. The resulting increase in the rate water passes through the watershed further exacerbates peak flow and base flow changes caused by other aspects of timber harvest (Jones and Grant 1996).

Increased peak flow is detrimental to salmon because the resulting bedload overturn can scour stream channels, kill incubating eggs, and displace juvenile salmon from winter cover (McNeil 1964; Tschaplinski and Hartman 1983). Large woody debris is important to salmon due to its role in storing sediment, halting debris flows, and decreasing downstream flood peaks (Reid 1998). Large woody debris also provides velocity refugia for salmonids during winter flows.

Changes in stream temperature are considered harmful to salmon because these species are adapted to the specific, natural temperature ranges of their natal streams. Laboratory studies concluded that changes in stream temperature ranges can alter salmon development, growth, survival, and the timing of life history phenomena (Beschta *et al*. 1987). Based on the conclusions of these laboratory studies, increased temperatures beyond the preferred or optimal ranges of salmon are expected to cause juvenile salmon to leave their rearing areas or decrease their rates of growth. Berman and Quinn (1991) reported that fecundity and viability of spring chinook salmon eggs were reduced by elevated water temperatures. High temperatures can inhibit the upstream migration of adult salmon and increase the incidence of disease throughout a salmon population. As stream temperatures increase, competition between salmon and warmwater fish species, which can cause salmon populations to become extirpated as a result of the competitive pressure (Reeves *et al*. 1987). Excessive concentrations of fine sediment in spawning and rearing habitats can reduce survival of embryos and alevins by entombing embryos and reducing flow of dissolved oxygen, decreasing interstitial hiding places, altering production of macro-invertebrates, and reducing the total volume of pools. Bjornn and Reiser (1991) reviewed data from four laboratory studies and found that percent emergence of swim-up fry began to decrease when percent fine (2-6.4 mm) sediment exceeded 15%, and that embryo survival began to decrease when percentages of fine sediment exceed 10 to 15%.

<u>Range Management</u>
Several literature reviews on the effects of grazing on salmonids and their habitats have been published in recent years (Spence *et al.*, 1996; Belsky *et al.* 1999; NOAA Fisheries 1999). There is general agreement that problems with study design, natural variability, prior grazing history, natural grazers and other outside effects in watersheds can make it difficult to draw broad generalizations about the effects of livestock grazing on fish populations. There is also agreement that more, and better designed studies, are needed. Less agreement is evident on how best to characterize, describe, and approach grazing management that promotes healthy aquatic ecosystems.

Although drawing broad generalizations on fish population impacts is difficult, much is known about the detrimental impacts that grazing can have on riparian and other watershed areas (Platts 1991; Spence *et al.* 1996; Belsky *et al.* 1999; NOAA Fisheries 1999). The importance of these areas to salmonids and their habitats is also well known and described (Spence *et al.* 1996; Hall and Lantz 1969; Karr and Schlosser 1978; Lowrance *et al.* 1985; Wesche *et al.* 1987; Gregory *et al.* 1991; Platts 1991; Welsch 1991; Castelle *et al.* 1994; Lowrance *et al.* 1995; Wang *et al.* 1997, Bilby and Bisson 1998, Naiman *et al.* 2000). This information can be used to make reasonable predictions about the impacts to salmonids and their habitats that can occur from livestock grazing when site specific data are not available.

Livestock operations can adversely affect salmonids and their habitats in a number of ways, including degradation of water quality, stream channel morphology, hydrology, riparian vegetation and soils, and instream vegetation. Belsky *et al.* (1999) summarized the effects of riparian grazing into five categories, which are described below:

> *"a. Effects of riparian grazing on hydrology and channel morphology*
> As grazing intensity increases, more upland vegetation is lost and soil compaction occurs. Less water enters the soil and more flows directly into streams during storms, increasing peak flows. If increases in peak flows cause channel downcutting or incision, riparian plants can be lost if their roots become suspended in drier soils. An increased sediment load is also delivered downstream if the channel downcuts. The channel may widen as

streambanks are disrupted by livestock and channel stability may decrease due to loss of riparian vegetation. Ultimately, gravels, large woody debris, pools, and other important components of fish habitat can be lost as disruption of the channel's banks increases.

b. Effects of riparian grazing on biodiversity
Most studies show decreases in some species and increases in others. Native biological diversity, including game species, declines as the landscape becomes homogenized by grazing. Riparian specialists are lost. Habitat generalists and weed species often predominate: (1) Weedy exotics usually increase because they benefit from the disturbance regime created by livestock. Sub-dominant species may be released if larger plants are eaten, and upland species that prefer drier conditions may be promoted; (2) neo-tropical (Neotrops) birds and prairie water birds are variably affected. Neotrops that are restricted to riparian habitats are usually harmed, and (3) cold water fish species such as salmonids decline in number and biomass, while warmer water species may increase .

Cold water fish species can be lost due to the following factors (among others): Higher water temperatures, greater turbidity, increased sedimentation, lower summer flows, low dissolved oxygen, damage to spawning beds, less protective plant cover, fewer insects and other food items, stream bank damage, and decreased hiding cover

c. Effects of riparian grazing on water quality
Livestock grazing can be a significant contributor of bacterial contamination to surface and drinking water. Livestock wastes can contribute nutrients which stimulate algal and aquatic plant growth that if excessive can lead to large algal blooms and die offs which result in loss of dissolved oxygen as the algae decomposes. Other detrimental water quality effects include increased water temperature and turbidity.

d. Landscape and regional effects of riparian grazing
Intensive grazing in uplands can result in increased runoff and erosion in watersheds which can impact riparian communities downstream via sedimentation and increased bank erosion.

e. Effects of riparian grazing in humid (wet) environments
Effects are similar and may be more or less damaging depending upon specific situations. Moist soils are more vulnerable to disturbance and compaction. Livestock may not congregate close to streams if wet conditions keep upland grasses plentiful."

Mining
The potential effects of mining activities on salmonids and their habitats are discussed in Meehan (1991), Spence *et al*. (1996), and USDC (1997b) and Nelson *et al*. (1991). These effects include: sediment production from tailings piles, stock piles, and haul roads; changes in stream channel morphology; and changes in stream flow regimes. Certain types of mining operations can also result in acid mine drainage into streams and release of toxic metals such as arsenic, cadmium,

chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, and zinc into streams. In addition, chemicals such as drilling fluids, flotation reagents, and cyanide used in exploration and precious metal extraction may be released into streams. These substances can reduce or eliminate aquatic invertebrate populations which serve as food for fish or, in sufficient concentration, can result directly in fish kills.

Impacts from gravel mining on physical channel conditions have been well documented in the published literature. Although Brown *et al.* (1998), and Pauley *et al.* (1989) have conducted studies that include biological effects of gravel mining, impacts to aquatic biota from gravel extraction are not as well documented. Brown *et al.* (1998) compared mined sites to reference reaches in gravel bed streams and found that total fish densities in pools were higher in reference reaches than in mine sites and downstream reaches; biomass and densities of invertebrates were higher in reference reaches; bank full channel widths were significantly increased at mining sites; and distance between riffles was increased, resulting in fewer pools in reaches downstream of mine sites. Although the Pauley *et al.* (1989) study was of short duration and their sample size was not large enough for statistical testing for some effects, the authors were able to make inferences regarding changes in channel form and resultant impacts to habitat function for salmonids from gravel bar skimming. These included: (1) Decreased channel confinement, with widening and shallowing of the low flow channel and decreased water depths over riffles which created adult salmonid migration barriers; (2) obliteration of side channels with complex habitat on skimmed bars and formation of secondary channels that lack complex habitat features, resulting in reduced habitat for salmonids; and (3) channel instability at the top of skimmed bars, with an increase in the probability of redd scouring.

Instream gravel extraction operations have the potential to impact proposed and listed salmonids, and their habitats, within the action area. These impacts may include mortality during active mining operations, disruption of holding and migration patterns by heavy equipment noise and vibration disturbance, increased stranding of salmonids on extraction bars, increases in water temperature, elevated turbidity/sediment, channel degradation at tributary mouths, impacts to migratory, rearing and holding habitat, impacts to spawning habitat, and loss of large woody debris (Halligan 1997a; Humboldt County 1992; Humboldt County 1994). Many of the impacts to channel form and function from gravel mining are well understood, and are minimized or avoided through project design features (*e.g.*, the use of one-foot minimum vertical buffers to maintain channel confinement). Other impacts may be chronic in nature, and occur incrementally with, subsequent to, and offsite from the mining activity (*e.g.*, possible reduction of substrate size, increased turbidity, and the potential decline in spawning gravel quality).

The use of portable suction dredges to recover gold from streambeds can adversely impact salmonid eggs and sac fry which may be present in stream gravels. Salmonid eggs and fry can be crushed by the dredging process or displaced from the redd and exposed to predators. Disturbance of the stream substrate by dredging can also cause sediment to be transported downstream where it can settle out and smother eggs and fry in redds (IDWR 1996). Since small suction dredges are usually powered by a gasoline engine, there is the potential for small amounts of fuel to be spilled into a stream during refueling.

Watershed Restoration

NOAA Fisheries has identified three general categories of Watershed Restoration actions that could be implemented under the direction of the RMPs that may affect listed salmonids: (1) Instream fish habitat enhancement and restoration projects; (2) culvert replacement upgrades; and (3) road decommissioning. To minimize redundancy, the discussion of culvert replacement upgrades and road decommissioning will be grouped. Some short-term adverse effects such as increased turbidity or streambed sedimentation may accrue from restoration activities such as culvert removal and replacement, road obliteration, and activities occurring within the active stream channel or Riparian Reserves. However, these actions should provide a long-term benefit for ESA-listed fish species.

Instream Fish Habitat Enhancement and Restoration Projects

The benefits of instream habitat enhancement structures are generally short-term in duration, although they may be appropriate for limited use to augment longer-term riparian rehabilitation and sediment source reduction (Frissell and Nawa 1992, Reeves *et al*. 1991, FEMAT 1993, USDA-FS and USDI-BLM 1994). For example, the placement of rootwads and other large wood pieces within the stream channel may provide salmonid habitat structure and cover for a period of years until large conifers are restored in Riparian Reserves. The creation of off-channel rearing areas may provide overwintering habitat for coho salmon until road decommissioning, other restoration actions, and natural disturbance processes restore floodplain functions and channel complexity.

Culvert Replacement Upgrades and Road Decommissioning

As stated in the ROD (1994), "...existing culverts, bridges, and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flow including associated bedload and debris. The ROD (1994) further states that "crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure." Benefits realized from replacement or upgrading of culverts may include: (1) Improving or reestablishing fish passage to currently underutilized or unoccupied critical habitat; (2) reestablishing the passage of woody debris and sediment; and (3) minimizing the total amount of sediment that could be transported to critical habitat.

Road decommissioning is perhaps the most significant and beneficial action for the long-term maintenance and restoration of aquatic habitats (Furniss *et al*. 1991; FEMAT 1993). Road decommissioning includes a variety of measures associated with restoration of hydrologic functions and risk reduction by minimizing road-related sediment delivery to streams (*e.g.*, culvert removal, decompaction of road surfaces (ripping), outsloping, waterbarring, fill removal, revegetating with native species, and roadway barricading exclude vehicular traffic).

All instream construction activities, including culvert installation and repalcement, as well as road decommissioning actions will inevitably result in disturbance of stream substrates and downstream sediment delivery. Depending on the proximity of project site disturbance to fish habitat, short-term fine sediment pulses from earthwork and related instream activities may adversely affect the survival of some fish life stages. Incidental take associated with these projects is possible from detrimental effects on aquatic habitat parameters including substrate quality, turbidity, and suspended sediment levels, all of which may directly affect the survival of various life history stages of these fish. Because of the potential for short-term adverse effects, such projects must be meticulously designed, timed, and implemented to minimize adverse effects to listed, proposed, and candidate salmonid species.

<u>Fish Surveys</u>
The primary effect of conducting surveys in or near stream channels is disturbance to adult and/or juvenile fish and a potential for trampling on incubating embryos in the gravels. Sampling techniques like smolt traps and electro-fishing may result in injury or death to individual fish.

<u>Fire and Fuels Management</u>
Ground disturbing activities associated with the suppression of wildfire may result in an increase in sediment delivery to streams. The use of chemical fire retardants is important for the suppression of wildfires. The effects of fire retardants on salmonids are discussed in Meehan (1991) and Spence *et al*. (1996). The use of prescribed fire may result in an increase of nutrients and fine sediment in to streams (Spence *et al.* 1996), and there is a potential for prescribed fire to kill streamside vegetation.

2.1.4.3 Overview of ACS

The ACS was developed to restore and maintain ecological health of watersheds (and the aquatic ecosystems contained within them) on federally-managed lands within the NWFP area (ACS FSEIS 2003). The proposed action states that "(T)he proper scales for Federal land managers to evaluate progress toward achievement of the ACS objectives are the watershed and broader scales. No single project should be expected to achieve all ACS objectives." This clarification language is consistent with the FSEIS (1994), which stated:

> "To succeed, any aquatic conservation strategy must strive to maintain and restore ecosystem health at watershed and landscape scales. Thus, this is the approach of the Aquatic Conservation Strategy. This approach seeks to prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds."

NOAA Fisheries expects that individual or groups of actions could result in localized, short-term adverse affects to listed species and critical habitat. Also, given that the action area includes watersheds that are not properly functioning, and that projects that maintain existing conditions would be considered consistent with the ACS, NOAA Fisheries anticipates that implementation of actions that maintain existing degraded conditions would be consistent with the ACS.

However, we anticipate that these effects would be short-term and localized in nature because the ACS is designed to address and ameliorate negative impacts at larger scales over long time periods. For instance, the ACS amendment (BA, page 60) emphasizes a concept from the FEMAT (1993) Chapter V, and the 1994 ROD, Page B-12 "Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of ACS objectives." Thus, projects within Riparian Reserves would be designed to protect and restore aquatic habitats at larger scales. Further, riparian buffers have been generally accepted as a way to minimize, mitigate, and, in some areas, avoid the adverse effects of timber management on aquatic communities (FEMAT 1993, Thomas *et al.* 1993, Spence *et al*. 1996). The 1994 ROD established Riparian Reserve widths to meet ACS objectives for different types of waterbodies. These widths are designed to provide a high level of fish habitat and riparian protection (BA, page 53). Also, projects must be consistent with RMPs as amended, including the ACS. This means implementation of all four components of the ACS, which are intended to achieve ACS objectives (BA page 62). Finally, although other land use allocations are not formal components of the ACS, LSRs, Congressional Reserves and Administratively Withdrawn land allocations all provide important protection for riparian and aquatic ecosystems (BA page 78).

2.1.4.4 The Four Major Components of the Aquatic Conservation Strategy

The ACS contains four cornerstone components: (1) Riparian Reserves, (2) Key Watersheds, (3) WA, and (4) Watershed Restoration, which encompass both special land allocations and associated standards and guidelines. To assess the effects of the proposed action on ESA-listed salmonids, each ACS component will be assessed, including specific standards and guidelines, contained within sections C and D of the 1994 ROD.

<u>Riparian Reserves</u>

This section of the Opinion provides an overview of the effects of Riparian Reserves on listed species and their critical habitat. Effects of Riparian Reserve standards and guidelines that preclude or regulate management within Riparian Reserves, *i.e.*, timber management, road construction and maintenance, grazing, recreation, minerals management, fire/fuels management, research, and restoration activities, will be individually and collectively analyzed later in this section of the Opinion.

The 1994 ROD established Riparian Reserves for five categories of streams or waterbodies. The widths of the individual categories are defined based on multiple criteria. This multiple criteria approach is consistent with the Spence *et al.* (1996) recommendation that "it is reasonable to propose buffers of varying absolute widths based on specific reach-level characteristics." The interim Riparian Reserve widths for each type of waterbody were designed to optimize the cumulative effectiveness of the relevant riparian functions (*e.g.*, shading, root strength, large wood recruitment, organic matter input, water quality, microclimate).

Ecologically healthy watersheds require the influence of riparian forests on streams, especially in relation to controlling the light and temperature regimes, providing nourishment for the stream biota, and being a source of large woody debris (Naiman *et al.* 1998). While processes occurring throughout a watershed can influence aquatic habitats, the most direct linkage between terrestrial and aquatic ecosystems occurs in the riparian area adjacent to the stream channel (Spence *et al.* 1996). Riparian buffer areas are a management tool designed to protect the canopy cover over streams, provide recruitments for large woody debris, add small organic matter to streams, stabilize streambanks, regulate nutrient and pollutant inputs to streams, and reduce potential adverse effects from sediment that is not captured through other management measures (Spence *et al.* 1996). Further, riparian buffers have been generally accepted as a way to minimize, mitigate, and, in some areas, avoid the adverse effects of timber management on aquatic communities (FEMAT 1993; Thomas *et al.* 1993; Spence *et al*. 1996). Reid and Hilton (1998) reported that riparian buffer strips provide an efficient and widely accepted way to help protect aquatic ecosystems and downstream values from the effects of upslope land-use activities.

Maintaining appropriate channel form is particularly important both for sustaining aquatic ecosystems and for controlling off-site impacts (Reid and Hilton 1998). Large woody debris is the principal factor determining the characteristics of aquatic habitats in low- and mid-order forested streams (Naiman *et al.* 1998), and is a critical physical component of forestland channels because it traps sediment and dissipates flow energy (Reid and Hilton 1998). Large woody debris beneficially affects listed species and critical habitat in numerous ways, including, but not limited to: (1) Moderating peak flows (Spence *et al.* 1996); (2) dissipating energy, which reduces bed and bank erosion; (3) storing and routing both fine and coarse sediments (Naiman *et al.* 1998;); (4) promoting development of pools; (5) retention of spawning gravels; (6) increasing channel complexity; and (7) providing refugia to listed species during both high flows and low flows.

Based on a review of the literature concerning recruitment of large woody debris to stream channels (Meehan 1991; NWFP ROD 1994; Spence *et al.* 1996; Naiman *et al.* 1998; Reid and Hilton 1998), NOAA Fisheries expects that interim Riparian Reserves widths will maintain and restore the distribution and abundance of large woody debris across the plan area, and that, over time, recruitment of large woody debris will approximate natural recruitment rates. Due to the importance of large woody debris relative to the maintenance and restoration of properly functioning conditions of critical habitat, NOAA Fisheries expects that the distribution and abundance of listed species will increase as a result of increases in large woody debris across the plan area. However, as reported in the 1994 ROD, the amount of coarse woody debris in streams has been reduced due to a variety of timber harvest practices and associated activities, and that many riparian areas on Federal lands are inadequate long-term sources of wood. Thus, NOAA Fisheries expects that reestablishment of adequate levels of large woody debris will often take decades, and that it is vitally important to maintain the currently properly functioning sources of large woody debris.

In addition, the widths of interim Riparian Reserves are expected to provide for a cumulative effectiveness of 100% relative to litter fall, root strength and stream shade. Maintenance and reestablishment of the natural processes and ecological functions associated with litter fall, root strength, and stream shade are also key components of properly functioning critical habitat for listed species across the plan area.

Another function of Riparian Reserves is the regulation of sediment transport. Riparian vegetation and downed wood act as physical barriers to trap sediment that is moving overland during rainfall events (Spence *et al.* 1996). However, riparian buffers are much less effective in regulating channelized erosion. After reviewing studies examining sediment transport below roaded areas on forested soils, Belt *et al.* (1992), concluded that riparian buffers are ineffective in controlling sediments resulting from channelized flows that originate outside of the riparian buffer; and that removal of natural obstructions to flow within the buffer, *e.g.*, vegetation, woody debris, rocks, increases the sediment transport distance. Given the difficulty in controlling sediment once flows are concentrated, NOAA Fisheries expects that actions implemented outside of Riparian Reserves may have a more than negligible probability of resulting in sediment mobilization and transport to stream courses under the conditions described by Belt (1992). Thus, Riparian Reserves may not eliminate all adverse effects to listed species and critical habitat due to implementation of actions outside of the reserves. However, Riparian Reserves will maintain or promote recovery of critical habitat, while at the same time minimizing impacts resulting from actions implemented outside of the reserves.

NOAA Fisheries expects that Riparian Reserves will play a critical role in maintaining and restoring ecologically healthy critical habitat throughout the range of the NWFP. However, the degraded conditions of many of the Riparian Reserves underscores the importance of implementing actions that maintain properly functioning riparian zones or promote recovery of currently degraded riparian zones. The FSEIS (USDA and USDI 1994a.) indicated that WA is required prior to the final delineation and management of the Riparian Reserve network in a watershed, as described below.

Modifying the Interim Riparian Reserve Buffer Widths

The 1994 ROD described the process required to modify the prescribed (interim) widths of Riparian Reserves:

> "Interim Riparian Reserve boundary widths remain in effect until they are modified following Watershed Analysis, site analysis, and NEPA documentation. Watershed Analysis will identify critical hillslope, riparian and channel processes that must be evaluated in order to delineate Riparian Reserves that assure protection of riparian and aquatic functions. Riparian Reserves are delineated during implementation of site-specific projects based on analysis of the critical hillslope, riparian and channel processes and features. Although Riparian Reserves may be adjusted on permanently-flowing streams, the prescribed widths are considered to approximate those necessary for attaining Aquatic Conservation Strategy objectives. Post-Watershed Analysis Riparian Reserve boundaries for permanently-flowing streams should approximate the boundaries prescribed in these standards and guidelines. However, post-Watershed Analysis Riparian Reserve boundaries for intermittent streams may be different from the existing boundaries.

NOAA Fisheries expects that over time, site-specific analysis will result in greater protection of aquatic habitat values than is currently afforded by the interim Riparian Reserve widths as Riparian Reserves are adjusted. The process for tailoring Riparian Reserves to site conditions is detailed in the 1994 ROD, and is not changed by the ACS SEIS. NOAA Fisheries expects that there will be a low likelihood that Riparian Reserve designations would result in less protection than currently exists with the interim Riparian Reserve designations given that "(W)atershed Analysis will identify critical hillslope, riparian and channel processes that must be evaluated in order to delineate Riparian Reserves that assure protection of riparian and aquatic functions." Also, since the ROD was signed in 1994, there have been very few decisions made to modify the interim widths.

Key Watersheds

Approximately 9 million acres are designated as Key Watersheds, which represents about 37% of the area of the NWFP. Tier 1 Key Watersheds were selected for directly contributing to anadromous salmonid and bull trout conservation. Tier 2 Key Watersheds were selected as sources of high quality water and may not contain at-risk fish stocks. For strategically located Key Watersheds where no high quality habitats presently exist, this designation was intended to focus habitat restoration efforts to augment natural recovery processes and hasten the development of high quality habitat.

Key Watersheds serve as refugia and are crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat have a high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program.

The protective measures, including the standards and guidelines relating to roads, and restoration emphasis of Key Watersheds are consistent with the conservation of salmonids, in that Key Watersheds are large blocks of land that will be protected and restored, with a trend toward an appropriate range of attributes for salmonid viability.

Watershed Restoration

Existing ecological conditions in many reserve allocations are severely degraded as a result of past land management activities that predated the NWFP. While the ACS relies on natural ecosystem disturbance processes to recover aquatic habitats over time, certain strategic habitats that currently lack high quality salmonid habitat, need active restoration efforts to hasten natural recovery and provide immediate benefits for Pacific salmonids.

The NWFP recognizes that habitat restoration efforts are not intended to replace natural recovery processes or to mitigate for additional adverse effects of new management actions. Instead, habitat restoration projects are intended to provide short-term ecological benefits until the results of natural recovery processes are realized. For example, the most important restoration priorities are generally the control of road-related runoff and sediment production, restoration of watershed hydrologic functions, and restoration of Riparian Reserve functions. Restoration programs continue to focus on road improvements and vegetation treatments in Riparian Reserves to accomplish these priorities. Instream restoration is inherently short-term and must be accompanied by upslope and riparian restoration to achieve long-term Watershed Restoration.

As reported in the BA (USDA and USDI 2003b.) fish habitat has been restored directly or indirectly by: (1) Reducing sediment and improving flow by decommissioning roads, erosion control, and upgrading sizes of culverts; (2) improving instream fish habitat complexity; (3) improving fish passage at road crossing; and (4) restoring riparian vegetation functions by planting, seeding and thinning riparian areas. A particular focus of Watershed Restoration has been the reduction of road mileage. The BA (USDA and USDI 2003b) indicates that approximately 1770 miles of roads have been decommissioned across the area of the NWFP for differing time periods, *i.e.*, the data does not include all years since the signing of the 1994 ROD for some administrative units; therefore, the reported number of road miles is probably an underestimate of actual miles decommissioned.

Adverse effects related to culvert upgrades and decommissioning primarily involve short-term introductions of sediment and turbidity, reductions in shade associated with removal of trees immediately adjacent to culvert projects (either upgrades or decommissioning sites), and often capture and relocation of individual listed species during dewatering of project sites. Although these actions often result in a reduction in the number of individuals, based on the best available science concerning the effectiveness of road restoration activities, these projects have an overall beneficial effect on the populations and Pacific salmonids ESUs within the action area.

<u>Watershed Analysis</u>

The WA process is a systematic procedure designed to bridge the gap between analysis at the RMP scale and the project scale by characterizing the aquatic, riparian, and terrestrial features and management issues within a watershed. The NWFP discusses WA and its utility for establishing existing and potential watershed conditions as they relate to aquatic habitat.

The 1994 ROD, as amended by the ACS FSEIS (USDA and USDI 2003a), states that "(T)he project record will demonstrate how the agency used relevant information from applicable Watershed Analysis to provide context for project planning, recognizing that Watershed Analysis is not a decision-making process in and of itself, nor is Watershed Analysis a decision document. The aforementioned language is consistent with the original intent of the role of WA as described in the 1994 ROD:

> "The focus of Watershed Analysis will be on collection and compilation of information about the watershed that is essential for making sound management decisions. It will be an analytical process, not a decision-making process with a proposed action requiring NEPA documentation. It will serve as the basis for developing project-specific proposals, and defining monitoring and restoration needs for a watershed. The scope of some issues or resources may require broader scale analyses. The information from the Watershed Analysis will contribute to decision making at all levels. Project-specific NEPA planning will use information developed from Watershed Analysis. For example, if Watershed

> Analysis shows that restoring certain resources within a watershed could contribute to achieving landscape or ecosystem management objectives, then subsequent decisions will need to address that information."

NOAA Fisheries expects that data compiled during WA will help ensure that actions proposed under the program are consistent with the ACS. Thus, although some actions may result in short-term adverse effects to listed salmonids and critical habitat at the project-scale, overall critical habitat conditions should improve over time.

2.1.4.5 Standards and Guidelines

Riparian Reserve Standards and Guidelines

Standards and guidelines for Riparian Reserves are specific to aquatic habitat, and are crucial to attaining the goals of the ACS. The 1994 ROD states that "(A)s a general rule, standards and guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the ACS objectives. Watershed Analysis and appropriate NEPA compliance is required to change Riparian Reserve boundaries in all watersheds."

A number of Riparian Reserve S&Gs reference the ACS objectives. The 2004 ROD (as discussed in the March 17, 2004, letter) states, on pages B-10 and C-31, that to comply with Riparian Reserve standards and guidelines that reference ACS objectives, the decision maker must determine "...from the record that the project is designed to contribute to maintaining or restoring the fifth-field watershed over the long term, even if short-term effects may be adverse." Further, "The record for a project within a Riparian Reserve must: 1) describe the existing condition, including the important physical and biological components of the fifth-field watershed(s) in which the project area lies; 2) describe the effect of the project on the existing condition; and 3) demonstrate that in designing and assessing the project the decision maker considered and used, as appropriate, any relevant information from applicable watershed analysis."

To ensure that effects to listed salmonids at smaller spatial and temporal scales are taken into account when specific projects are planned and implemented, the proposed action (BA, Appendix 1) describes an analysis process designed to evaluate, within the context of WA, potential localized and short-term impacts to listed salmon. For instance, listed salmon utilize stream habitats in waters covered under the NWFP to spawn, and as juvenile rearing and adult holding habitat. Each of these essential habitat components is often found in discrete locations within specific segments of streams. Effects to these often geographically small, but biologically important areas may not be observed at the fifth-field watershed scale over the long term. However, under the ACS, as amended by the FSEIS, these resource values would be identified in WA, and potential impacts would be addressed during project design and the NEPA process, as well as during project-level ESA and MSA consultations.

Because of the close linkage between the stream and terrestrial ecosystems, logging, livestock grazing, mining, and other activities can have numerous effects on the stream ecosystem and its salmonid populations (Murphy and Meehan 1991). The extent to which Riparian Reserves minimize, mitigate, and avoid adverse effects depends on the restrictions that are set in place for those actions that could occur within the buffered zones. Specific standards and guidelines preclude or regulate management (*e.g.*, timber management, road construction and maintenance, grazing, minerals management, fire/fuels management, research, and restoration activities) within Riparian Reserves. The following discussion will look at the role Riparian Reserve standards and guidelines have on the implementation of potential management actions, and the potential effects the implementation of those actions could have on listed salmonids and aquatic habitat.

Timber Management

The 1994 ROD states that timber harvest will be prohibited within Riparian Reserves except if salvage, fuel wood cutting, and other silvicultural practices to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics are needed to attain ACS objectives. These standards and guidelines limit harvest in Riparian Reserves to silvicultural practices that are "required to attain Aquatic Conservation Strategy objectives," and tree salvage and fuelwood cutting "...only when Watershed Analysis determines that present and future coarse woody debris needs are met and other Aquatic Conservation Strategy objectives are not adversely affected" (ROD C-32). Implementation of this standard and guideline will help restore riparian vegetation, thereby increasing the future availability of large woody debris. Given the high percentage of Riparian Reserves that were harvested in the past, timber management actions that promote recovery of healthy riparian areas will help increase bank stability and restore channel form and function as large woody debris is recruited. However, implementation of timber management actions within Riparian Reserves, necessary to attain ACS objectives, may result in localized increases in fine sediment transport to fish-bearing streams and decreases in stream shade, resulting in adverse effects to listed species and their critical habitat. Adverse effects may include reductions in pool quality and quantity and also increases in water temperature. However, NOAA Fisheries expects that timber management actions consistent with the requirement "needed to attain ACS objectives," will result in minor, localized effects, and that long-term beneficial effects to listed species and critical habitat would result.

Roads Management

Standards and guidelines for road management in Riparian Reserves are listed on pages C-31 and C-32 of the 1994 ROD. These S&Gs pertain not only to new construction, but also to the management of existing roads. For example, RF-4 states that:

> "New culverts, bridges, and other stream crossings shall be constructed, and existing culverts, bridges, and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and

down the road in the event of crossing failure. When constructing new roads, wetlands must be avoided; sidecasting will be restricted as necessary to prevent sediment introduction to streams; stream crossings will be constructed to pass a 100-year flood, and provide and maintain fish passage at all existing and potential fish-bearing streams; crossings will be constructed and maintained to prevent diversion of streamflow out of channel and down road in event of failure; and road drainage will be routed away from potentially unstable channels, fill, and hillslopes.

Under the ACS, Road Management standard and guideline RF-7, the action agencies are required to "(D)evelop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy objectives." To summarize, this plan shall include provisions for: (1) Inspections and maintenance during and after storm events; (2) road operation and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources; (3) traffic regulation during wet periods to prevent damage to riparian resources; and (4) establish the purpose of each road by developing the Road Management Objective.

Although roads may have unavoidable harmful effect on streams (Furniss *et al.* 1991; Megahan 1987; Jones and Grant 1996), the Road S&Gs were developed to minimize the impacts new roads on salmonids and their habitat. Furniss *et al.* (1991) summarized steps that are necessary to minimize impacts of roads relative to aquatic habitats:

> "The basic strategy to prevent or minimize damage from roads is to understand the physical and biotic conditions that could be affected. Then, planning should ensure that roads are designed, constructed, and maintained to reduce the risks of erosion; that the risk of eroded material entering streams is low; that disturbances to channel morphology will be reduced or eliminated; that the alteration of hillslope drainage patterns will be minimized; and that fish will be able to migrate past stream crossings."

Roads constructed under the NWFP will continue to have adverse affects on listed salmonids and their critical habitat due to increases in sediment and turbidity, however, implementation of the Road S&Gs in conjunction with proper planning, and project-level analysis and design will minimize these effects. NOAA Fisheries anticipates that implementation of the Road S&Gs will minimize adverse effects to listed species and critical habitat due to new road construction. Further, road upgrades will eliminate or reduce chronic and potential sources of sediment, and improve fish passage by replacing stream crossings that are currently migration barriers. Properly constructed and reconstructed roads and stream crossings will improve critical habitat conditions across the plan area.

Grazing

The 1994 ROD contains three standards and guidelines that refer to grazing practices within Riparian Reserves. All three of the grazing standards and guidelines reference the ACS objectives; however, one does state specifically that new livestock handling and/or management facilities will be located outside of Riparian Reserves. The remaining standards and guidelines state that grazing practices, existing livestock handling facilities, and livestock trailing, bedding, watering, loading, and other handling efforts, will either meet or not retard or prevent attainment of the ACS objectives. If grazing practices retard or prevent attainment of ACS objectives, they will be eliminated. Likewise, if existing facilities do not meet attainment of ACS objectives, then they shall be relocated or removed. Site specific guidance to minimize potential project impacts on important aquatic and riparian resources will flow from WA, will be applied during project design, and will be evaluated during project-level review and ESA section 7 consultation as described in the USFS and BLM BA (2003). At the program level, implementation of grazing actions consistent with the standards and guidelines should minimize adverse effects to listed species and their critical habitat resulting from reductions in riparian vegetation, inputs of fine sediment and trampling of redds.

Mining

The standards and guidelines for minerals management: (1) Require a reclamation plan, approved Plan of Operations, and reclamation bond for all minerals operations that include Riparian Reserves. (MM-1); (2) Require location of structures, support facilities, and roads outside Riparian Reserves, or, where no alternative to siting facilities in Riparian Reserves exists, locate them in a way compatible with ACS objectives (MM-2); (3) Prohibit or otherwise restrict solid and sanitary waste facilities in Riparian Reserves (MM-3); (4) For leasable minerals, prohibit or otherwise restrict surface occupancy within Riparian Reserves for oil, gas, and geothermal exploration and development activities (MM-4); (5) Condition salable mineral activities such as sand and gravel mining and extraction within Riparian Reserves so that ACS objectives can be met (MM-5); (6) Require inspection and monitoring for mineral plans, leases or permits, and modification of mineral plans, leases and permits as needed to eliminate impacts that retard or prevent attainment of ACS objectives (MM-6).

Actions that are consistent with the mining S&Gs may result in increases in turbidity and fine sediment transport, and may also result in toxic spills. Also, actions may simplify critical habitat (*e.g.*, gravel mining) or destabilize the channel bed (*e.g.*, suction dredging). Thus, actions that are consistent with the mining S&Gs may result in adverse effects to listed species and critical habitat. These effects would be addressed in subsequent project-level ESA consultations.

Watershed and Habitat Restoration

There are three standards and guidelines for watershed and habitat restoration activities within Riparian Reserves. The standards and guidelines focus on restoring habitat. The standards and guidelines state that Watershed Restoration projects shall be designed and implemented in a manner that promotes long-term ecological integrity of ecosystem, conserves the genetic integrity of native species, and attains ACS objectives; that Federal, state, local, tribal agencies, and private landowners will cooperate to develop watershed-based coordinated RMPs or other cooperative agreements to meet ACS objectives; and that mitigation or planned restoration will not be used as a substitute for preventing habitat degradation.

Implementation of actions consistent with the watershed and habitat restoration S&Gs should result in improved critical habitat conditions over time. Large-scale watershed improvement programs will benefit listed species and their habitat.

Fire and Fuel Management

The majority of the fire and fuel management standards and guidelines relate the action back to the ACS objectives. The standards and guidelines also state that fuel treatment fire suppression strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuels management activities could be damaging to long-term ecosystem function (FM-1). The standards and guidelines also state that a resource advisor will prescribe the location, use conditions, and rehabilitation requirements if incident bases, camps, helibases, staging areas, helispots, or other centers for incident activities must be located in Riparian Reserves (FM-2). Implementation of these standards and guidelines should reduce impacts from future wildland fires and also fire suppression activities.

Key Watershed Standards and Guidelines

Standards and guidelines for Key Watersheds include, but are not limited to:

- Inside roadless areas - No new roads will be built in remaining unroaded portions of inventoried (Rare II) roadless areas.

- Outside roadless areas - Reduce existing system and nonsystem road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds.
- Key Watersheds are highest priority for Watershed Restoration.

- Watershed Analysis is required prior to management activities, except minor activities such as those Categorically Excluded under NEPA (and not including timber harvest).

The high percentage of the NWFP within Key Watersheds (37%) combined with the restoration emphasis, including no net increase in roads, results in one of the most important components of the NWFP relative to reducing impacts to listed species and, at the same time, restoring and maintaining critical habitat.

Other Standards and Guidelines

Although other land use allocations are not formal components of the ACS, Late Successional Reserves (LSR), Congressional Reserves and Administratively Withdrawn land allocations also provide protection of riparian and aquatic ecosystems. For example, the S&Gs under which LSRs are managed provide increased protection for all stream types. Because these reserves possess some late-successional characteristics, they can offer core areas of high quality stream habitat that will act as refugia and centers from which degraded areas can be re-colonized as they recover. Streams in these reserves may be particularly important for endemic or locally distributed fish species and stocks (1994 ROD, B-12).

2.1.4.6 NWFP Monitoring

All administrative units are expected to participate in regional implementation and effectiveness monitoring efforts. Implementation monitoring indicates whether individual and groups of actions are implemented in a manner consistent with RMP direction. Effectiveness monitoring addresses assumptions made by the FEMAT, *e.g.*, whether the changes to RMPs affected by the NWFP are effective in achieving the ACS objectives, including improved aquatic habitat conditions at the watershed or broader scale in the long term.

<u>Implementation Monitoring</u>
Fiscal year 1996 was the pilot year for implementation monitoring (Alverts *et al*. 1996 draft). The pilot project focused on timber sale reviews conducted by interagency, interdisciplinary, and intergovernmental teams. The diversity of ideas, backgrounds, disciplines, and public involvement in the review process resulted in a vigorous review of each timber sale. Initial results indicate that, with a few minor exceptions, the USFS and BLM are consistently implementing the standards and guidelines of the NWFP. For fiscal year 1997, timber sales, roads, and restoration projects would be the priority topics for implementation monitoring. Between 1997 and 2001, implementation monitoring has shown nearly 100% compliance with implementing 1994 ROD standards and guidelines in the project planning process.

<u>Aquatic and Riparian Effectiveness Monitoring</u>
The AREMP has been developed by the regional Research and Monitoring Committee, a technical subcommittee of the Interagency Advisory Committee, to provide strategy and recommendations for implementing effectiveness monitoring of aquatic and riparian systems throughout the NWFP region. AREMP was developed pursuant to ROD direction (E-7) that "monitoring will include aquatic, riparian, and watershed conditions and the processes in a watershed to determine if they achieve ACS objectives." A pilot effort was proposed for 2002 and 2003 and AREMP is planned to be fully implemented beginning by 2004 (Reeves *et al.* 2001).

AREMP will ultimately provide data on the condition of aquatic habitats within watersheds that will document the overall effectiveness of the ACS across the NWFP. In the short-term, project level monitoring, research results, and annual implementation monitoring will provide information on the impacts projects and conformance with applicable standards and guidelines. This information will be used for future project design and administration to minimize adverse environmental impacts.

2.1.4.7 RMPs within the Area of the NWFP, not amended by the NWFP

The CRGNSA plan was not amended by and does not incorporate the NWFP. The CRGNSA management plan applies to all ownerships within the scenic area. The National Forest lands within the CRGNSA are governed by the RMPs of the Gifford Pinchot and Mt. Hood NFs in Washington and Oregon, respectively, which were amended by the NWFP. However, those portions of these National Forests within the CRGNSA are managed under the scenic area management plan, which provides more stringent protection and thus takes precedence over the RMP direction. For a complete description and analysis of the CRGNSA, see the March 23, 1999, addendum to the 1997 BA (USDA and USDI 1999).

The Mendocino NF is located entirely within the NWFP area except for the Lake Red Bluff Recreation area which is located adjacent to the Sacramento River in the City of Red Bluff. This area is about 490 acres and includes campgrounds, trails, boat ramps, a fish ladder operated by the US Fish and Wildlife Service, and a non-profit Sacramento River Discovery Center. The Mendocino National Forest RMP ROD stated that the NWFP ACS would be incorporated on the entire forest including the Lake Red Bluff area.

There are approximately 25,000 acres or about 1% of the Wenatchee NF area that is outside the range of the Northern spotted owl and technically would not be under the NWFP. These lands are within the PACFISH ACS area but the Wenatchee NF RMP was not amended by the PACFISH decision notice. These lands are primarily along the Columbia River Breaks with other small parcels in the lower Wenatchee, Tieton and Naches watersheds. The lands are very dry with few perennial streams let alone fish habitat. The Forest is managing these lands using NWFP ACS specifically the S&Gs for the Riparian Reserves and WA to guide management. The Forest Supervisor has committed to the continued management of these lands under the NWFP ACS in a letter addressed to the Forest Service Columbia River Basin PACFISH coordinator dated July 1, 1999 (USDA 1999).

The Proposed ACS amendment will also affect management of the Coquille Forest. In 1996 Congress passed an act creating the Coquille Forest from about 5400 acres of BLM administered lands within the area of the NWFP. These acres are now held in trust by the United States for the benefit of the Coquille Indian Tribe, and are no longer administered by the BLM. The Act required that management of the Coquille Forest lands will be subject to the standards and guidelines of Federal Forest plans on adjacent or nearby Federal lands, now and in the future. The adjacent Federal lands are Coos Bay BLM District lands; therefore, the Coquille Forest is affected by this proposed amendment to the Coos Bay BLM Resource Management Plan.

2.1.4.8 Summary of Effects

A primary component of the NWFP is the ACS. The ACS contains four cornerstone components: (1) Riparian Reserves, (2) Key Watersheds, (3) WA, and (4) Watershed Restoration. “These components are designed to operate together to maintain and restore the productivity and resilience of riparian and aquatic ecosystems. They will not achieve the desired results if implemented alone or in some limited combination” (FEMAT 1993). The proposed action clarifies that under the ACS, the agencies must maintain existing conditions or implement actions to restore conditions at the fifth-field watershed scale over the long term.

The analysis of effects in this Opinion includes both the overall plan-level effects of implementing RMP management direction, as amended by the proposed action, and generalized potential on-the-ground effects of common management actions consistent with the plans at various spatial and temporal scales. The initial response of individuals of the species and their critical habitat relative to implementation of individual RMP actions will occur at a spatial scale that is much smaller than the scale associated with attainment of the ACS objectives. Impacts to listed species and their critical habitat at scales smaller than the fifth-field watershed are greatly influenced by site-specific conditions, project design, and implementation. Specific effects to listed salmonids from individual management actions could not be addressed in this Opinion as we cannot predict the nature of individual actions that will occur beyond the general categories and their general effects. Effects to salmonids at the site-specific scale will be analyzed in future project-level section 7 consultations. Generally, each category of actions (forest management, range management, mining, grazing, Watershed Restoration, fire and fuels management, and fish and wildlife management) has the potential to cause adverse effects to listed salmonids and their critical habitat. Effects vary from minor habitat changes, to reductions in growth rates, to death of individuals. Some of these actions (*i.e.*, forest management within Riparian Reserves, Watershed Restoration, and fuels management) may also have beneficial impacts on the functions of riparian buffer areas.

Various components of the proposed action either maintain properly functioning salmonid habitat, or promote recovery of salmonid habitat over time by maintaining or restoring wood, water and sediment regimes. NOAA Fisheries expects that Riparian Reserves will play a critical role in maintaining and restoring ecologically healthy critical habitat throughout the range of the NWFP. The degraded conditions of some of the Riparian Reserves underscores the importance of implementing actions that maintain properly functioning riparian zones or promote recovery of currently degraded riparian zones. Riparian Reserves are expected to maintain or promote recovery of critical habitat, while at the same time minimizing impacts resulting from actions implemented outside of the reserves. Restoration or maintenance of healthy riparian areas will be important components in increasing both the distribution and abundance of listed species across the action area.

Past implementation monitoring has shown nearly 100% compliance with implementing ROD standards and guidelines in the project planning process. If the assumptions underlying the NWFP hold true that plan implementation will result in improved habitat conditions for listed salmonids, then high levels of compliance with the standards and guidelines should help achieve these goals. No effectiveness monitoring data are available from which to evaluate the impact of those standards and guidelines on attainment of ACS objectives at this time, however.

NOAA Fisheries expects that aspects of the ACS that reduce or eliminate road-related impacts, including road decommissioning actions across the plan area (and specifically in Key Watersheds) when added to the protective and restorative measures of the interim Riparian Reserve buffers will allow for the maintenance and recovery of critical habitat elements for listed species. Over time, as sediment sources are reduced and large woody debris increases, NOAA Fisheries expects that pool habitat will increase, while a coarsening of gravels will result in increased quality and quantity of spawning habitat. Removal of migration barriers will increase habitat utilization, availability of habitat, and fish distribution. Based on the combined effects of implementation of different components of the plan and ACS, NOAA Fisheries expects that the plan will result in an increase in numbers, reproduction, and distribution of listed salmonids, as well as maintain and restore critical habitat values in the action area.

2.1.5 Cumulative Effects

Cumulative effects are defined as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR § 402.02). For the purposes of this consultation, the action area includes those portions of the 25 administrative units within the subject ESUs and managed under the NWFP, and river reaches downstream of the administrative unit boundaries that may be affected by Federal land management activities.

The dominant land-use activities on non-federal lands within the watersheds inhabited by all 25 of the ESUs considered in this Opinion are forestry and agriculture. The adverse effects of these actions are discussed in Section C above. In most of the ESUs, a small but increasing proportion of this non-federal land is being used for urban growth. In some areas within these ESUs, urbanization is more pronounced. A substantial portion of the remaining spawning and rearing habitat for the listed salmonids occurs on USFS and BLM lands. Gradual improvements in habitat conditions for salmonids are expected on these lands as a result of RMP implementation.

2.1.5.1 State and Private Salmon Restoration Activities

The States within the range of the NWFP have developed, or are developing, conservation plans or strategies for the listed salmonid species. The Federal NWFP ACS effort has been augmented by the Oregon and Washington State efforts to protect and recover habitat important to the at-risk fish species on non-federal land. Companion aquatic conservation strategies for non-federal lands are necessary to accompany the Federal NWFP ACS in order to significantly accrue benefits for ensuring the viability of fish species and increase the likelihood of NWFP ACS success (FEMAT1993).

Oregon

The State of Oregon developed a comprehensive ACS (The Oregon Plan) with components complementary to the NWFP ACS. In 1997 the Oregon Coastal Salmon Restoration Initiative was renamed the Oregon Plan for Salmon and Watersheds and was broadened to steelhead populations of the Oregon coast and Lower Columbia including Willamette River. On January 14, 1999, Governor Kitzhaber expanded the Oregon Plan for Salmon and Watersheds (Oregon 1997) to include all at-risk wild salmonids throughout the State.

The goal of the Oregon Plan is to "restore populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits." Components of this plan include: (1) Coordination of efforts by all parties; (2) development of watershed action plans with relevance and ownership at the local level; (3) monitoring progress; and

(4) making appropriate corrective changes in the future. This process included chartering 84 locally-formed and represented “watershed councils” across the State. Membership on the watershed councils includes: landowners, businesses interests, agricultural interests, sport fishers, irrigation/water districts, individuals, State, Federal, and Tribal agencies, and local government officials.

Washington

Washington State has developed a salmon restoration strategy while the State legislature and agencies have taken progressive actions to protect and recover at-risk fish populations and habitat. The draft Statewide Strategy to Recover Salmon, Extinction is not an Option, was produced by the Washington Governor's Salmon Recovery Office (Washington Governor’s Salmon Recovery Office 1999) and Joint Natural Resources Cabinet. The plan describes how State agencies and local governments will work together to address habitat, harvest, hatcheries, and hydropower as they relate to recovery of listed species.

The Washington State legislature established the Salmon Recovery Act and Watershed Management Act to assist in salmon recovery efforts. The Watershed Management Act provided funding and a planning framework for locally based watershed management addressing water quality and quantity. The Salmon Recovery Act provides the direction for the development of limiting factors analyses on salmon habitat and creates a list of prioritized restoration projects at the major watershed level. The salmon and steelhead inventory and assessment program is currently updating its database to include the entire State, which consists of an inventory of stream reaches and associated habitat parameters important for the recovery of salmonid species.

In January 2000, the Washington Forest Practices Board (2000) adopted new emergency forest practice rules based on the "Forest and Fish Report" development process. These rules address riparian areas, roads, steep slopes, and other elements of forest practices on non-federal lands. Although some provisions of forest practice rules represent improvements over previous regulations, the plan relies on an adaptive management program for assurance that the new rules will meet the conservation needs of listed salmonids. The Forest and Fish Report development process relied on broad stakeholder involvement and included State agencies, counties, Tribes, forest industry and environmental groups. A similar process is also being used for agricultural communities in Washington and is known as "Agriculture, Fish, and Water."

California

NOAA Fisheries does not have any information regarding specific future non-federal actions reasonably certain to occur within the action area in California. The predominant land use on private lands in the action area in California is timber harvest. NOAA Fisheries expects that timber harvest and associated road construction would continue on into the future, and impacts on listed species and their critical habitat would be similar to past timber harvest actions. Timber would be harvested in accordance with the California Forest Practice Rules. Timber harvest and associated road construction often results in increased sediment delivery to stream courses, along with reductions in large woody debris. Adverse effects associated with increased sediment delivery and decreases in large woody debris include reductions in pool quality and quantity, and degradation of other rearing habitat utilized by juvenile and adult salmonids in the action area. Also, road-related activities, such as road maintenance and reconstruction, that are either related to timber actions or California Department of Transportation programs and that occur in the wetted perimeter of streams where listed juvenile salmonids are present can result in direct mortality. Other ongoing activities such as agriculture and urban development are also expected to continue at similar rates and levels as in the past. The effects of these actions include increased sediment inputs, inputs of pesticides and herbicides, and increased storm water runoff.

NOAA Fisheries is not currently aware of any general changes to existing State and private activities within the action area that would cause greater impacts than presently occur to any of the salmonid species considered in this Opinion.

2.1.6 Conclusion

NOAA Fisheries has determined, based upon the best available scientific and commercial information, that habitat baseline conditions for anadromous salmonids within the action area are improving due to implementation of the NWFP over the last nine years. Future implementation of the ACS as amended by the SEIS and incorporated into the 25 RMPs addressed in this Opinion is expected "to maintain and restore the productivity and resilience of riparian and aquatic ecosystems" (FEMAT 1993). The combined and conscientious application of all of the ACS components, in conjunction with implementation of relevant standards and guidelines, is not expected to result in a reduction in the numbers, distribution, or reproduction of the listed species that would appreciably reduce their likelihood of survival and recovery or destroy or adversely modify designated critical habitat.

NOAA Fisheries has determined, based on the information and analysis described in this Opinion and in NOAA Fisheries (1996, 1999), that implementation of the RMPs for the 25 administrative units are not likely to jeopardize the continued existence of subject listed species or result in destruction or adverse modification of critical habitat.

The potential effects of individual or groups of land management activities will be assessed during project-level ESA consultations subsequent to this plan-level Opinion.

2.1.7 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. NOAA Fisheries believes the following conservation recommendations are consistent with these obligations, and therefore should be carried out by the action agencies.

The USFS and BLM action agencies are among the nine federal resource agencies (NOAA Fisheries, FWS, Bonneville Power Administration (BPA), Corps of Engineers (COE), U.S. Bureau of Reclamation (USBR), U.S. Forest Service (USFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), and the Environmental Protection Agency) with operational and program management responsibilities in the Columbia River Basin that established the Federal Caucus through a Memorandum of Understanding (MOU) signed in December 2000. The MOU describes federal agency commitments to effectively implement and coordinate federal agency actions pursuant to the Basinwide Recovery Strategy (All H Paper) and other related efforts concerning the conservation of ESA-listed fish within the Columbia River Basin. These nine federal agencies have agreed to work cooperatively to integrate and manage the successful implementation, evaluation and reporting of a comprehensive Columbia Basin salmon recovery strategy. Successful implementation requires an unprecedented level of program integration and collaboration through the Caucus.

NOAA Fisheries recommends that action agencies intensify their efforts in the Federal Caucus to collaborate on a number of collective efforts directed toward conservation of ESA-listed threatened and endangered salmonid species within those administrative units addressed in this Opinion that occur within the Columbia Basin.

In order to achieve this NOAA provides the following conservation recommendations to the action agencies:

1. Assist the Northwest Power and Conservation Council's subbasin planning process for those species and programs that function at scales larger than the subbasin, including anticipated ESA recovery planning efforts. The action agencies' participation in the Council's process should occur at three levels: *Basin-scale* - through participation in the Federal Caucus's "Subbasin Planning Sub-team" (includes Caucus involvement with Council's Level 3 process); *States* – through coordination between Regional Office Planning Directors and State Coordinators (Council's Level 2 process); and the *Subbasin or Local level*- through participation by individual administrative units in the subbasin planning process (Council's Level 1 process).

2. Provide for the transfer of technical and other information with subbasin planning groups. Share information, technology and expertise, and pool resources, in order to make and implement better-informed decisions related to ecosystems and adaptive management across jurisdictional boundaries.

3. Coordinate subbasin planning with their agency's goals, data management systems, assessment, planning, and budgets. Gain efficiencies by assisting the states, where possible, in development of a quality assurance/quality control that ensures subbasin plans can be used in recovery planning.

4. Cooperate with the other federal agencies, states and tribes in the development of recovery plans and conservation strategies for listed and proposed fish species. Require

that land management plans and activities be consistent with approved recovery plans and conservation strategies.

5. Collaborate with other federal agencies, states, tribes and local watershed groups in the development of watershed plans for both federal and non federal lands and cooperate in priority restoration projects by providing technical assistance, dissemination of information and allocation of staff, equipment and funds.

6. Develop and implement strategies to prioritize restoration. Collaborate with other federal agencies, states and tribes to improve integrated application of agency budgets to maximize efficient use of funds towards high priority restoration efforts on both federal and non-federal lands.

7. Collaborate with other federal agencies, states and tribes in database and monitoring efforts to assess if habitat performance measures and standards are being met.

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)]. Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102]. Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3]. Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02]. The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

An incidental take statement specifies the impact of any incidental taking of listed species. It also provides reasonable and prudent measures that are necessary to minimize the effects of take and sets forth non-discretionary terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of Take

Notwithstanding NOAA Fisheries' conclusion that continued implementation of management direction in the subject management plans is not expected to jeopardize the continued existence of subject listed species or result in destruction or adverse modification of designated critical habitat, agency decision makers retain enough discretion when implementing management direction in the RMPs that NOAA Fisheries anticipates more than a negligible likelihood of incidental take of these species may result from some such actions. NOAA Fisheries is unable to anticipate all possible circumstances related to continued management plan implementation, including programmatic actions or individual projects that might be developed in the future. As a result, NOAA Fisheries is unable to issue a “blanket” incidental take statement or a comprehensive list of reasonable and prudent measures to cover all programs and actions subsequently implemented pursuant to management plan direction. Accordingly, we are deferring exemption of incidental take to individual (or grouped action) level consultations.

2.2.2 Reinitiation of Consultation

Based on the effects of the proposed actions described in the BA and this Opinion, NOAA Fisheries anticipates that an unquantifiable amount of incidental take could occur. To ensure protection for a species assigned an unquantifiable level of take, this consultation or conference must be reinitiated if: (1) New information reveals effects of the action may affect listed species in a way not previously considered; (2) the action is modified in a way that causes an effect on listed species that was not previously considered; or (3) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR § 402.16).

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